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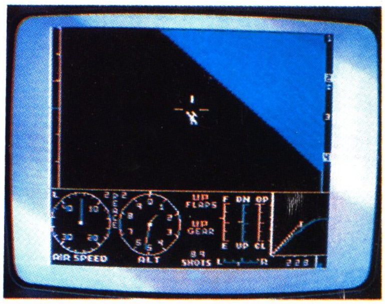
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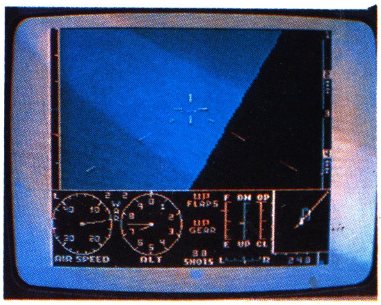
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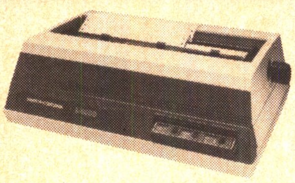

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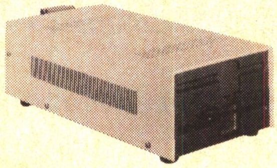

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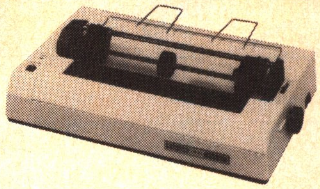

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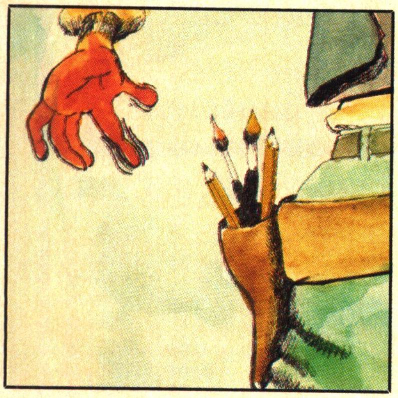
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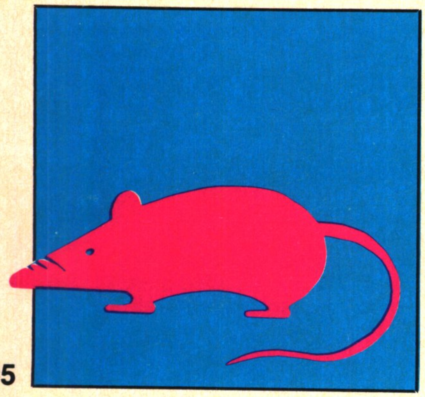
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🖭 The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 71.

NEXT MONTH: Our CoCo is "alive with the sound of music" in our June issue. Listen to the computer version of Chopin's "Minute Waltz." Learn the "ivory" keyboard with *Piano Tutor*. Take on a challenge as CoCo plays the notes and you guess the song, and learn how to compose your own tunes with a tutorial on the SOUND command. Usher in more summertime fun with *Animatic*, a program which aids in the creation of animated graphics. Also, see how to assemble wireless joysticks, and set up a mailing list program in BASIC09.

Combined with more features, our regular columns and hardware and software reviews, THE RAINBOW is a symphony for CoCo lovers. Look for THE RAINBOW for the best information on the Color Computer available anywhere!

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May 1985 Vol. IV No. 10

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LETTERS TO THE RAINBOW

One-Liner Lessons

Editor:

I would like to take this opportunity to thank Tim Skene of Montreal, Quebec, for the idea and THE RAINBOW for the publication of "One-Liners."

As the teacher of students in the Chapter 1 (reading and math) program in a small school, I am constantly on the lookout for programs that will benefit my students. THE RAINBOW has been my main source of all the ready-made programs that I use in my classroom. (I guess I should be thanking all those individuals who have been submitting ideas to THE RAINBOW.) But I especially appreciate the "One-Liners" because my kids can now type in their own programs in the limited time we have together.

The computer is not only teaching my students by telling them what to do; now they are learning by telling the computer what to do!

Barb Karr
Risingsun, OH

THREE CHEERS FOR OS-9 BOOK

Editor:

Congratulations! The book on OS-9 is wonderful!

We received our copy of the book when we returned from vacation and were overjoyed to finally see it in print. It has been ooo'd and ahh'd over by the entire staff here at Microware. We hope you sell thousands! You know the old saying "good things come to those who wait" and the waiting appears to have been well worth it.

Again, congratulations!

Ken Kaplan and the staff of Microware
Des Moines, IA

COCO NEEDS UPWARDLY MOBILE PRODUCTS

Editor:

I've just returned from the Irvine RAINBOWfest. It was a terrific show and you certainly did a great job of putting it all together. There were several outstanding products on display, including Micro Works' video digitizer and Colorware's *CoCo Max*. But to my mind, the most outstanding exhibits — outstanding because they develop "upward mobility" for the Color Computer — were the 10mb hard disk and the 68008 board displayed by RGS Micro.

I've worked extensively with minicomputer system hard disks and with micro-based systems such as the IBM XT, and with Tallgrass Technology 35 and 70mb hard drives. In the few minutes I was able to elbow my way in and work with RGS' drive, I was able to determine that it was at least the equal in speed and transparency to any other drives I have used. Of course, it is most useful, I think, under OS-9. If there is substantial demand, the price — which is not unreasonable but is still high — could probably drop substantially.

For those who are having a difficult time using OS-9 with the 35-track drives, a cheaper solution than a hard disk is available. For under $200, you can add a double-sided, 80-track drive (TEAC FD-55F, available from California Digital for $139), which you can use with D.P. Johnson's *SDISK* and *Bootfix* (about $45) as an OS-9 boot disk. This gives you over 737K of storage on one drive at a six ms step rate (so you can compile short C programs in four to five minutes) and it is bootable.

You also need to add a drive connector (available from Radio Shack for about $5) to your drive cable (it crimps right on). To use the drive as two 80-track drives, you can purchase Spectrum Projects' *Spectrum DOS* for Disk BASIC. Just take a 35-track out of the case and replace it with your new drive. I'm sure there are other vendors and products which will do the same things, but I use the ones mentioned.

I'd like to close with a plea to those writing OS-9 software: Please don't hard-code things that are not absolutely necessary to hard-code. If it's a word processor, don't hard-code 80 characters to a line for a line delete; don't tell the C compiler to look at /d1 for the defs and library directories; don't hard-code the size of a device into a device descriptor. It is really easier to use when users can configure software to meet their own needs.

Thanks for a great magazine!

Shneor Z. Sherman
Davis, CA

SUPPORTS EDUCATIONAL ENDEAVORS

Editor:

I just received the February issue of THE RAINBOW. I would like to support the suggestion offered by Paul French in the "Letters to Rainbow" section, Page 6 (an educational software programming contest).

I, too, am an educator. I have been both a classroom teacher and an educational administrator. What Mr. French says is true. There is a definite lack of quality educational software available for the Color Computer. The machine certainly has the potential for very good performance in the educational field. As Mr. French said, "anything would help." And I hope you will consider the idea.

David M. Crabtree
Mayaguez, Puerto Rico

CONSISTENCY COUNTS!

Editor:

I was amazed to see Richard White argue *against* a consistent increment of 10 or so in published programs [see "Bits and Bytes of BASIC in the February 1985 RAINBOW, Page 152]. Over a year ago, I wrote a machine language auto-numbering program which I use when programming or copying out of magazines. Colin Stearman's recent program has this feature. Such programs are also available commercially. Yet one cannot possibly use one of these if the increment is random!

When I do carpentry work, I have bits of wood and scraps of material scattered all over. Before I leave and send a bill, though, I sweep up the sawdust, haul off the scraps and straighten everything up. It's one mark of a professional. A programmer who wants to be published should do no less. Why must he leave his increments scattered randomly about, for the customer to struggle with? It makes no sense to save this ragged version as a final copy just because it works. He wouldn't think of submitting his program on torn, soiled notebook paper. Why, then, can't the `RENUM` command be used before submission to make the program as neat as the paper, and allow for auto-numbering?

There are, no doubt, sound reasons for starting at zero and incrementing by one. Fine. But, at least, let it be consistent!

Fred Sawtelle
Huntsville, TX

INFORMATION PLEASE

Editor:

I am a graduate student at Idaho State University working on a master's thesis in the area of computer-assisted instruction (CAI) among the mentally retarded population. As a CoCo owner for two years and a project director in a rehabilitation facility for three years, I believe that CAI has enormous potential as an instructional device for the mentally retarded.

The problem I'm having at this point is finding software for the TRS-80 with programs geared for this segment of the population. I would be interested in finding appropriate software for the mild to moderately retarded population, particularly in the area of telling time. This is the skill I would like to teach with CAI and contrast it to traditional methods of instruction.

I would greatly appreciate any information anyone can provide regarding software for the mentally retarded. Send information to 446 A. West Highway 39, 83221 or call (208) 785-5890.

David Allen
Blackfoot, ID

DATABAR ON THE AGENDA?

Editor:

Do you plan in the future to add databar programs to your magazine? At this time I believe it is possible to obtain a databar optical reader for the CoCo. If possible, I would like to see: 1) databar in the future; 2) articles on the uses and abuses of OS-9; 3) articles that evaluate the various talking software packages.

Is there an RBBS (TBBS) public domain program for the CoCo? I would prefer developing my own BBS source listing as commercial packages offer no "learning" experiences to "hackers."

Lynndel Humphreys
Orlando, FL

Editor's Note: We have no plans at present to use databar in THE RAINBOW. The Rainboard [November 1983, Page 20 and November 1984, Page 44] is a complete bulletin board for the CoCo. There are quite a few "Rainboards" around as this was a very popular article.

CONQUERING MACHINE LANGUAGE

Editor:

It is so nice to have a magazine come every month that is dedicated to my computer. Your people do a great job. I have been a subscriber ever since I purchased my computer. A wise decision for sure.

In three years, I have still not mastered BASIC, but I keep trying. My problem is I find many programs listed in your magazine in machine language. Do I have to buy a program in order to program my computer to accept these listings? Do I need more than 16K to do this? My Color BASIC and Extended BASIC instruction books don't tell me too much about programming in machine language. Then we go to OS-9 and FLEX. Boy, I have a lot to learn!

Dean B. Rice
North East, MD

Editor's Note: A short program for entering machine language programs is listed on THE RAINBOW Info page of this issue. See Page 80.

Editor:

I would like to know how to program in the machine language programs in your magazine, and can you please send me any other literature you may have on this subject?

I enjoy your interesting magazine and the programs you have every month.

David Walton
Marlboro, MA

Editor's Note: See Editor's Note above. Also, try *Color Computer Assembly Language Programming* by William Barden, Jr., Radio Shack Cat. No. 62-2077, for a start.

MEMORIES . . .

Editor:

I need a detailed memory map of the Color Computer 2. I need to know what each individual poke does if I poke there. If you could tell me where I could find a map of this kind, I would be very grateful.

Jeff Miller
Midland, VA

Editor's Note: We would suggest a disassembly rather than a memory map for your needs. Spectral Associates sells a three-book set of listings for your needs.

FORMING LETTERS

Editor:

Can you form regular letters (not using `DRAW`) in the `PMODE` form and if so, please tell me the solution.

Gregory Meyers
Pennsauken, NJ

Editor's Note: You may try storing a character set in an unused graphic page. Use `GET` `PUT` to transfer them to the working page.

THE COCO EXPRESS

Editor:

I am one of those CoCo nuts who is always thinking of new ways to use the full potential of my CoCo.

Recently, my children asked me to drag out their HO train set and refurbish it. As I was starting to put in some new scenery, the thought came to me — why not use the CoCo to run the train?

My only problem is there are so many possibilities of using the CoCo, I could not decide where to start.

If anyone out there has any information on this subject, or if there are any publications on CoCo-HO, I sure would like to be informed. Send information to 413 Bluebonnet Street, 70053.

Also, in response to the letter [March 1985, Page 7] regarding *Tarot*. No one falls under the devil without having prior desires to do so; just by "playing" with a program is an excuse to use these desires. I have been on both sides of the fence, so to speak, and I see no harm in using the CoCo in this way for entertainment. It is up to the individual to make his or her choice.

Tony Sciacca
Gretna, LA

Editor:

I would like to be able to help my church by putting church records and accounting on the computer but do not have the experience to program. I have a 64K Color Computer 2, one disk drive and a DMP-100 printer.

I would welcome any advice or information concerning available programs for church use from your readers. Thank you for your help. Send information to 501 Orange Street, 29440.

Charles W. Lawrimore
Georgetown, SC

HINTS AND TIPS

Editor:

If you type in both "Cooking With CoCo" and "Byte Master's" 51-column screen, they can be used jointly by typing in this program:

```
10 CLEAR 300,&H7CC1
20 LOADM"TEXT51":EXEC &H7CC2:NEW
```

and saving it as *AUTOEXEC.BAS* along with the ML driver *(TEXT51/BIN)* of the Hi-Res character set on your disk containing BASIC. Now, when you boot BASIC, you will instantly be in the new character set!

Andrew Ptak
Baltimore, MD

WORTH AN ESTIMATE

Editor:

I'd like to share an experience I had with Radio Shack repair department. My Multi-Pak, out of warranty, suddenly quit working and I took it to the computer center in San Mateo. Luckily, the clerk asked me if I wanted an estimate which I got over the phone the next day. The price to fix the Multi-Pak was $150.

They are selling the Multi-Pak now for $99.95! I had to pay $7.50 for the estimate and took the pack to a Radio Shack dealer who was a repairman on the premises. His charge was $35. The unit had a cold-solder at the switch, which actually is a fault in manufacturing, but it gave out after the warranty had expired. The lesson to learn: Always ask for an estimate, even if you have to pay for it.

George Abrams
Belmont, CA

NO-KEYBOARD CHALLENGE

Editor:

The *Hi-Res Racer* program by James Wood in your March issue [Page 124], was typical of his excellent work and contains the two things many people look for in a magazine listing: quality and brevity.

For those readers who enjoy these little challenges without using the keyboard, I have made a joystick revision.

```
 10 POKE 65494,0
379 POKE 65495,0
380 K=JOYSTK(0)
390 IFK<25 THEN D=88 ELSE IF K>40
    THEN D=144
449 POKE 65494,0
490 IF PEEK (65280)=254 THEN RUN
    ELSE 490 'FIRE BUTTON RESTART
```

Michael E. Fahy
Central City, PA

USEFUL ADDITIONS

Editor:

In the February 1985 issue, I typed in the *Disk Merge* program (Page 175) and it worked, but I decided it needed a couple of additions to make it more useful. Here are the additions I made:

1) Line 80 `VERIFY ON`
(Easy to see why this was done.)

2) Line 392

```
392 PRINT:
    PRINT"         COPY (Y/N)"
394 I$=INKEY$:IF I$=" "
    THEN 394
396 IF I$="N" THEN NEXT X
```

This gives you a chance to do a little editing as you go. One disk with a few files from one disk and a few more from others. Nothing big, just more options!

Aubrey Vickers
San Jose, CA

THE NEW CHIP ON THE BLOCK

Editor:

Motorola has recently released a new Video Display Generator chip, replacing the SHIFT-zero block characters with true lowercase characters. It is pin for pin compatible with the old 6847, and works with all hardware modifications such as the reverse-text switch or the Green Mountain Lower-Case kit. If you like custom characters, all three changes would be ideal. If interested, send $15 each and a self-addressed, stamped envelope to 4144 Rebel Trails Drive, 30135.

Gary McConville
Douglasville, GA

LEARNING ALONG THE WAY

Editor:

Ever since I purchased the first part of my Radio Shack Color Computer, I've enjoyed working with it very much, but my pleasure was much greater when I discovered THE RAINBOW.

I've particularly enjoyed the articles and programs which have helped me understand the whole computer operation much more than just the instruction manuals.

I've had no trouble with those programmed in BASIC, but I've had considerable difficulty with ML programs, especially in trying to transfer the programs I receive on tape to my disks. Occasionally, the article in the magazine tells how to do it, but generally not. I'd appreciate it if all articles would do so, or if you could give me some general directions for accomplishing this.

I've gradually enlarged my operation from my original CoCo 2 ECB 16K with cassette drive to three disks, 64K and DMP-110 Printer. I have noticed from the "Letters to Rainbow" that many people have had the same difficulty I had with finding an acceptable arrangement for their equipment. I recently purchased a computer table from The Sharper Image, 650 Davis Street, San Francisco, CA 94111. Their computer stand (#DGR103) at $149, and two shelf risers (#DGR104) at $69, offer ample room for all my equipment, including my nine-inch monitor and Multi-Pak Interface, and still leaves room for some of my books. I'm sure your subscribers would find this stand useful, especially for limited space arrangements.

I've also purchased the total *VIP Library* of software, plus many other programs advertised in your magazine. I find them all very useful and educational. Hopefully, I can learn to use the editor/assembler and OS-9 programs I've purchased in addition to the BASIC language which I studied at a local college.

Please keep up your good work.

Herbert E. Crumrine
Rochester, NY

BULLETIN BOARD SYSTEMS

Editor:

My bulletin board service has just opened and the first place I decided to advertise was the great Color Computer magazine, RAINBOW. This BBS offers a D/L section, Starbase One (sci-fi section), a boutique section with a lot to choose from, and a new feature, our G.I. Joe game (starting very soon). It's open 24 hours, seven days a week and is 300 Baud. Call (718) 251-2528.

Brian Greenwald
Brooklyn, NY

Editor:

I would like to announce the existence of the California BBS of Ventura. It's been running since October 1984. It has the following features: answers, bargains, converse mode, downloading, aide, intelligence, leave message, magazine, user log, questionnaire, read message, set ads, time viewing and want ads. The number is (805) 656-7390; it operates 24 hours a day, seven days a week. Also has four levels of access (0-3).

Jack Sanders
Ventura, CA

Editor:

We would like to announce the K-80 Color Board is now online 24 hours a day, seven days a week. It has all the standard features plus some extras! Call (615) 688-8349 for a good time.

Mike Anderson and Mike Phillips
Knoxville, TN

Editor:

I am a victim of the lure of telecommunications. Ever since we got our Modem I, I have been a member of the world of BBSs. Due to our recent move, I cannot find a bulletin board to start on. I am confident that once I get one I will be able to get lists of others in the area, so if anyone knows of a BBS within a local call of Endwell (in the Binghamton area), please write me at the following address: 905 White Birch Lane, 13760.

Chris Smith
Endwell, NY

Editor:

This is to announce the permanent location and phone number of the CoCoNut TBBS located at 4561 Lamont Ave.

Running 24 hours a day, seven days a week: TBBS 1.3 eight-word, one-stop, no parity, 300/1200 Baud, phone (513) 984-8705.

CoCo downloads, several well-written online games as well as the 3-D playboard and multi-user *War of the Worlds* written by James Gillum. Many special interest groups. (Texas Instrument, assembly language for the 6809, Timex/Sinclar and more.) The CoCoNut has been operating for about one year now, and has grown from a TRS-80 Color Computer, two-drive "Rainboard" to a TRS-80 Model 4 under TBBS 1.3, 300/1200 Baud with over one meg of online disk space.

Mark Wardell
Cincinnati, OH

Editor:

This is to inform you of my new BBS located in New York City. It is called Grand Central Terminal. We are online 24 hours a day, seven days a week. The system is dedicated to Color Computer users but everyone is welcome. You may reach us by calling (212) 682-0681 anytime.

Steve Schechter
New York, NY

Editor:

Announcing Chicago's newest BBS — CoCo Connection, (312) 477-4151, 300 Baud, U/D, 24 hours programming, hints, downloads.

Bryan Hidaka
Chicago, IL

BOUQUETS

Editor:

I want to take this time to express my opinion concerning the PBJ Company. I have bought their *CC Bus, Word-Pak II* and their products and service have excelled. If other software and hardware companies put out PBJ's quality of product and service, it would be a paradise for us users. Summing it up, I would recommend them to anyone. Although I've only scratched the surface on *Word-Pak II*, I am really impressed with it. Keep up the great magazine as we need people like you and Al to keep our CoCo alive and well.

William M. Carroll
Weirton, WV

200% IMPROVEMENT

Editor:

I am now a subscriber to THE RAINBOW after picking up my first issue at the store. A terrific magazine! I have not put it down since I bought it and have still not run out of useful information to read or programs to enter.

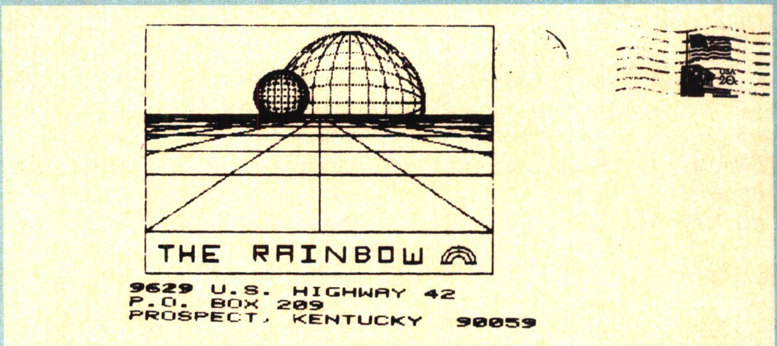
As for the typestyle being used to list the programs, please use the new daisy wheel for your listings! This is a 200 percent improvement over your present dot matrix listings.

One other thing, your Envelope of the Month for the March 1985 issue, your address and P.O. Box are incorrect [our old box number]. Interesting envelope though. Keep up the great work and I am looking forward to being a lifetime subscriber.

Roger Miller
Union City, CA

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, Falsoft, Inc., 9529 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

ARTS AND LETTERS



Envelope Of The Month

Chris Young
Fort Worth, TX

AIR TRAFFIC CONTROL SIMULATOR

"Caught in a blinding snowstorm, two jet airliners are on a collision course. The pilots are completely unaware of the imminent danger. Hundreds of lives are at stake. A high-speed disaster is inevitable unless you act fast . . ."

This and many other exciting scenarios await you as "Air Traffic Controller" with the AIR TRAFFIC CONTROL SIMULATOR. The thrills, challenges and frustrations you'll experience with this authentic, real-time simulation will lead to countless hours of discovery and adventure.

"The realism abounds . . ." "The documentation is excellent and even provides some training for a novice like myself." "It's a real buy!"
— RAINBOW, Feb. '85

"The best, most captivating simulation I've ever experienced!"
— W. Reisenauer, Pilot

"I am totally amazed at the realism of this program."
— D. Woodfin, Air Traffic Controller

"L.A. Center . . . Federal 215 Requests Instructions . . ."

"Federal 215 . . . Traffic 2 o'clock, Turn Heading 030°, Climb to 3000 ft."

★★★ A Complete Simulation Package ★★★
- Software on Disk or Tape
- Comprehensive Manual
- Quick Reference Card
- No Joysticks Required

★★★ ORDER NOW! ★★★
- NO DELAY for personal checks.
- Money Orders, COD's welcome.
- NO CHARGE postage, handling, COD's.
- NYS residents sales tax included.

32K MACHINE LANGUAGE
NOW ONLY $29.95 COMPLETE
DISK OR TAPE

DEALER INQUIRIES INVITED

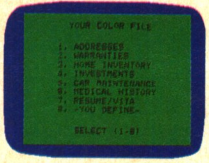
BETASOFT SYSTEMS
P.O. BOX 1174 • SMITHTOWN, NEW YORK 11787 • (516) 666-7240

RAINBOW CERTIFICATION SEAL

Radio Shack Has
Want for Your

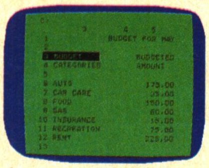
Save Time and Effort at Home

Color File.** An easy-to-use home filing system to alphabetize, select, examine, revise and store household records. Comes pre-set with seven files—or create your own. #26-3103 **24.95**



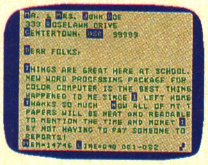
```
        YOUR COLOR FILE

   1. ADDRESSES
   2. WARRANTIES
   3. HOME INVENTORY
   4. INVESTMENTS
   5. CAR MAINTENANCE
   6. MEDICAL HISTORY
   7. RESUME/VITA
   8. -YOU DEFINE-

   SELECT (1-8)
```

Spectaculator®. Do home planning and budgeting with this electronic spreadsheet. Just enter numbers and formulas—results are displayed on command. Ideal for home financial forecasting. #26-3104 **34.95**



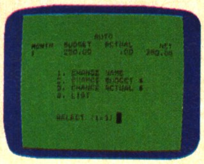
```
C1
          3          4       5
1                    BUDGET FOR MAY
2
3 BUDGET                  BUDGETED
4 CATEGORIES              AMOUNT
5
6 AUTO                      175.00
7 CAR CARE                   25.00
8 FOOD                      350.00
9 GAS                        80.00
10 INSURANCE                 15.00
11 RECREATION                75.00
12 RENT                     225.00
13
```

Color SCRIPSIT®. A powerful home word processing system for correction-free letters. Text can be saved on optional cassette recorder or printed with optional printer. #26-3105 **34.95**



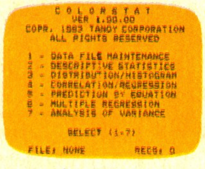
```
MR. & MRS. JOHN DOE
333 ROSELAWN DRIVE
CENTERTOWN, USA  99999

DEAR FOLKS,

THINGS ARE GREAT HERE AT SCHOOL.
NEW WORD PROCESSING PACKAGE FOR
COLOR COMPUTER IS THE BEST THING
HAPPENED TO ME SINCE I LEFT HOME
THANKS SO MUCH  NOW ALL OF MY T
PAPERS WILL BE NEAT AND READABLE
TO MENTION THE TIME AND MONEY I
BY NOT HAVING TO PAY SOMEONE TO
REPORTS!
MEM=14746 LINE=040 001-002
```

Personal Finance II. Includes 26 expense categories, including auto, gas, food and more. Review spending on year-to-date or category basis. #26-3106 **34.95**



```
              AUTO
MONTH   BUDGET    ACTUAL       NET
1       250.00       .00    250.00

     1. CHANGE NAME
     2. CHANGE BUDGET $
     3. CHANGE ACTUAL $
     4. LIST

     SELECT (1-4)
```

COLORSTAT.** Use your Color Computer to turn complicated home or business data into statistics for easy analysis, or print them on an optional printer for your records. #26-3107 **24.95**



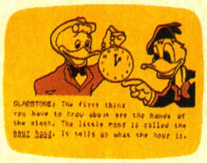
```
         C O L O R S T A T
            VER 1.00.00
   COPR. 1983 TANDY CORPORATION
        ALL RIGHTS RESERVED

  1 - DATA FILE MAINTENANCE
  2 - DESCRIPTIVE STATISTICS
  3 - DISTRIBUTION/HISTOGRAM
  4 - CORRELATION/REGRESSION
  5 - PREDICTION BY EQUATION
  6 - MULTIPLE REGRESSION
  7 - ANALYSIS OF VARIANCE

          SELECT (1-7)

  FILE: NONE              RECS: 0
```

*Joysticks required.
**Cassette recorder required.
***Joysticks and recorder required.

Educational Software from Walt Disney

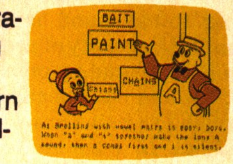
Your Choice 34.95 Each

Telling Time with Donald.** Teaching your children to tell time is easy with a little help from Donald Duck. For ages 5-8. #26-2530



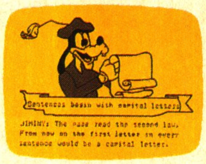
GLADSTONE: The first thing you have to know about are the hands of the clock. The little hand is called the hour hand. It tells us what the hour is.

Mickey's Alpine Adventure.** A frosty exploration of spelling and reading concepts. Learn important spelling rules and the sounds of vowels and consonants with Mickey Mouse and Donald Duck. #26-2534



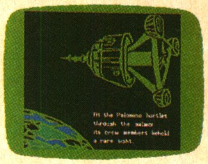
A: Spelling with vowel pairs is easy, boys. When "a" and "i" together make the long A sound, then a comes first and i is silent.

Mickey's World of Writing.** An exciting way to build important writing skills! Youngsters learn the basics of sentence structure and fundamental writing skills with Mickey Mouse. For ages 8-11. #26-2532



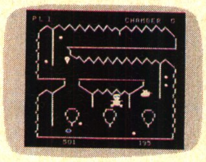
JIMINY: The page read the second law. From now on the first letter in every sentence would be a capital letter.

Space Probe: Math.** An exciting interstellar study of mathematical word problems. Youngsters learn the concepts of area and perimeter during outer space adventure. For ages 7-14. #26-2537

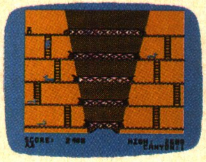


As the Palomino hurtles through the galaxy its crew members behold a rare sight.

Downland.* You're alone in a secret cave, traveling from chamber to chamber collecting keys, gold and diamonds. But can you jump, climb and run to safety? #26-3046 **24.95**



Canyon Climber.* Your climbing skills are under test when you find kicking goats, falling rocks, zinging arrows and more on your way to the summit. #26-3089 **34.95**



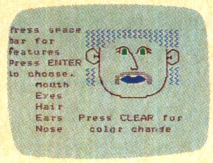
WALT DISNEY
PERSONAL COMPUTER SOFTWARE

SPINNAKER™
We make learning fun.

the Software You Color Computer

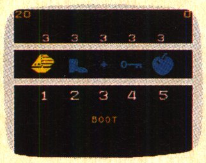
Learning Programs from Spinnaker

Your Choice
29^{95} Each

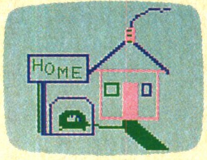

Press space bar for features
Press ENTER to choose.
Mouth
Eyes
Hair
Ears
Nose
Press CLEAR for color change

Facemaker. An exciting game to help your kids learn computer basics while they create an animated face. #26-3166

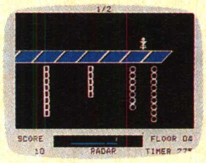
Kids on Keys. Your kids will enjoy learning with the computer as they identify numbers, letters and words. It's fun and your kids will learn important math and spelling skills. #26-3167


20
3 3 3 3 3
1 2 3 4 5
BOOT

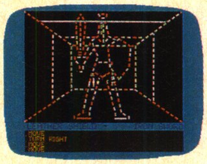
Kindercomp. Introduce your children to computer graphics! Even the youngest in your family will enjoy creating vivid color pictures and exciting sound effects by pressing a few keys. #26-3168



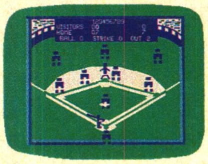
Fraction Fever. An exciting math contest! Your kids will develop a real understanding of fractional relationships as they guide their graphic "pogo stick" through this colorful game. #26-3169


1/2
SCORE 10
RADAR
FLOOR 04

Dungeons of Daggorath. You're pitted against a succession of awesome beasts in the fearful dungeon. Each victory brings you closer to your ultimate foe—the wizard. #26-3093 29^{95}

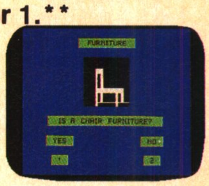


Baseball.* This exciting game plays just like the big leagues! You are the coach—it's up to you to control the pitching, defense, and running for extra excitement. #26-3095 24^{95}

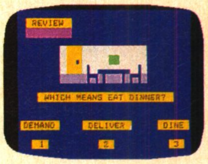


More Learning Fun for Your Kids

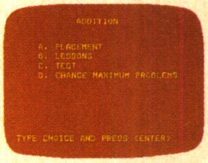
Vocabulary Tutor 1.** Give your children a head start in school. Start building their vocabulary at home with an exciting word and description matching game they'll love to play. For grades 3-5. #26-2568 8^{95}

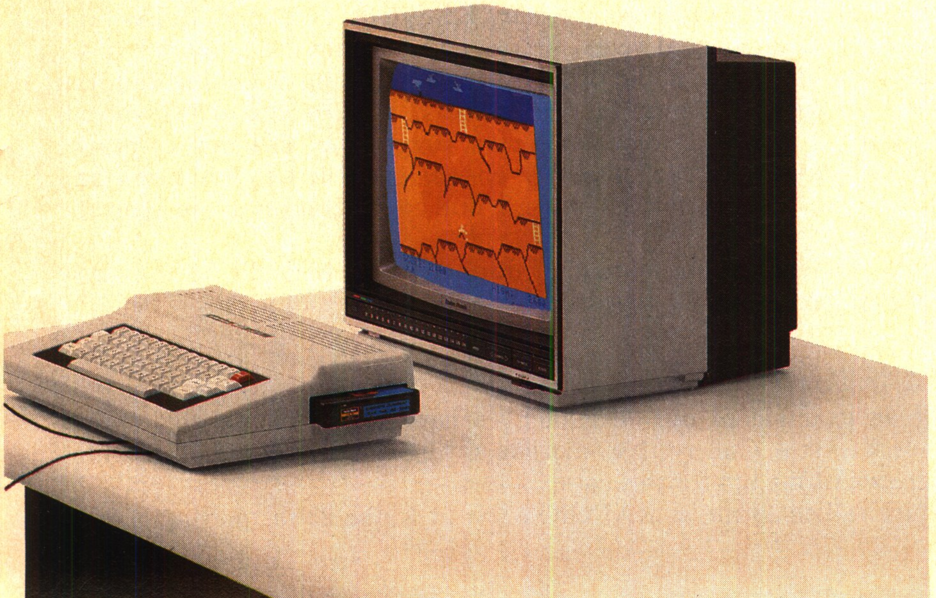

FURNITURE
IS A CHAIR FURNITURE?
YES
NO

Vocabulary Tutor 2.** More practice matching words and definitions and placing words in appropriate sentences. Great for helping young students get ahead. For grades 3-5. #26-2569 8^{95}


REVIEW
WHICH MEANS EAT DINNER?
DEMAND
DELIVER
DINE
1
2
3

Color Math.** Make learning fun. Supplement your children's study with problems in addition and subtraction. For ages 6-14. #26-3201 19^{95}


ADDITION
A. PLACEMENT
B. LESSONS
C. TEST
D. CHANGE MAXIMUM PROBLEMS
TYPE CHOICE AND PRESS (ENTER)



Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

Find out more about Radio Shack's Color Computer. Send for a free catalog.

Mail To: Radio Shack, Dept. 85-A-350
300 One Tandy Center
Fort Worth, Texas 76102

Name ____________________

Address ____________________

City __________ State ____ Zip ____

Telephone ____________________

Prices apply at Radio Shack Computer Centers and at participating Radio Shack stores and dealers. Disney, Mickey Mouse and Donald Duck are registered trademarks of Walt Disney Productions. Facemaker, Kids on Keys, Kindercomp, Fraction Fever and Spinnaker are registered trademarks of Spinnaker, Inc.

What sort of magazine do you want THE RAINBOW to be?

This is probably the biggest question we face on a daily basis here at Falsoft, Inc. The reason is simply that we always try to make our magazine — really your magazine — the best that it can possibly be.

One of the most interesting things is that we get a whole lot of mail, much of it addressed to me. Many of those letters start out with a sentence something like "I know you don't have time to read this . . . " The thing is that I do read the mail — all of it — and that is one of the important ways we are able to make changes and judge what everyone in the CoCo Community really wants from THE RAINBOW.

Another way we try to answer the question is through our RAINBOWfest surveys, as well as talking to literally thousands of folks who attend the shows. And, too, we often look in on the Color SIG on CompuServe. The input is necessary and desirable if we are going to be what *you* want us to be.

We listen, too. Even if you write a letter to our subscription department, a copy of that letter falls on my desk. If you call in with some question, our people are asked to pass along any comments you might make. All in all, we listen as much as we can.

Of course, we are fortunate here at THE RAINBOW. We have some 300 pages — plus or minus a few — to fill up every month. So, even if we run five or six business programs, there is still plenty of space for all our columns: a hardware project, a couple of games, some graphics ideas and the like. We have more editorial pages each month than everyone else has total pages — combined — for the Color Computer. Yes, it is true that something may not interest you, or a couple of things, but there are a lot of other things to interest you. That is one advantage that the sheer size of THE RAINBOW affords us.

We are fortunate, also, to have the largest number of advertisements — about four times the pages of everyone else combined. A reader once wrote that she considered "shopping" in THE RAINBOW the equivalent of being on the CoCo version of Fifth Avenue, North Michigan Avenue, the Rue St. Honore, the Via Conditti and Rodeo Drive all in one day. Whew! That's a biggie, but there is some fabulous "shopping" to be done in our pages.

Why am I going on and on about all this? Simply because we are coming up on our Fourth Anniversary Edition (in July) and, as has been usual for the last several years, we are approaching the point where we make some decisions about what we will be doing with our editorial content for the next 12 months. And, as usual, we want you to be involved. So, please, if you have some comments, suggestions, criticism or praise, write *me* about it. I can't possibly answer every letter, but I can and will read every one and each will get due consideration as we plan the year ahead.

Is this something unusual to do? I don't think so. After all, THE RAINBOW *is* your magazine and we want all of you to be a part of it.

* * *

As an example of our "listening," a new feature debuts this month — our RAINBOW Gallery. I would like to thank Mark Randall of Color America CoCo Club for this colorful idea.

Mark talked to me at RAINBOWfest in Irvine about putting a short

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...
— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor... outstanding in every respect.
— The RAINBOW, Jan. 1982

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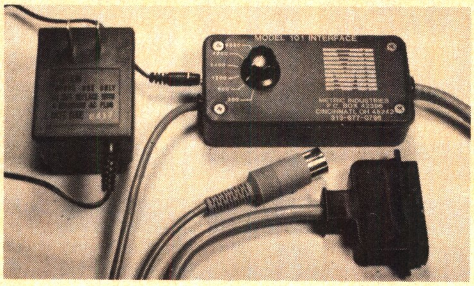
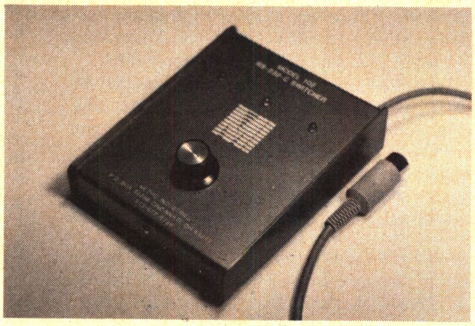
MODEL 101 INTERFACE 54.95

The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). It comes with a "UL" listed power supply that can be unplugged from the interface if your printer supplies power (Most do). The 101 is only 4" x 2" x 1" and comes with all cables and connectors for your computer and printer.



MODEL 102 SWITCHER 35.95

The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.



MODEL 103 COMBO 85.95

With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for modems, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, "UL" listed power supply and many more.

The Model 101, 102 and 103 will work with any level COCO basic, any memory size 4K-64K and are covered by a 180 day warranty.

The Model 101 and 103 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Gorillia, C.Itoh, Okidata and many others. They support basic print commands, word processors and graphic commands.

CASSETTE LABEL
CASSETTE LABEL PRINTING UTILITY
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This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, extended or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.

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feature in the magazine that could display the graphics talents of people, especially since several new graphics utilities have come out in the last few months. I think Mark's idea is a good one and you will see the results of his idea for the first time this month.

In the meantime, we encourage you to send in *your* artwork, along with a short note on how it was done and with which program. If we like it, we'll run it.

* * *

Speaking of RAINBOWfest, Irvine was just great! We are ready to do it again in Chicago, May 17-19, and I hope you will plan to attend. The Chicago show has traditionally been the biggest and we have every reason to believe this one will set a new record, too.

Except for the fact that I am scheduled to be the keynote speaker at the CoCo Community Breakfast on Saturday morning, there is going to be a top lineup for the show. And, for those of you who have been waiting, Dale Puckett will be in attendance to autograph his new book, *The Complete Rainbow Guide to OS-9*. That would be a good chance to get a copy to "save."

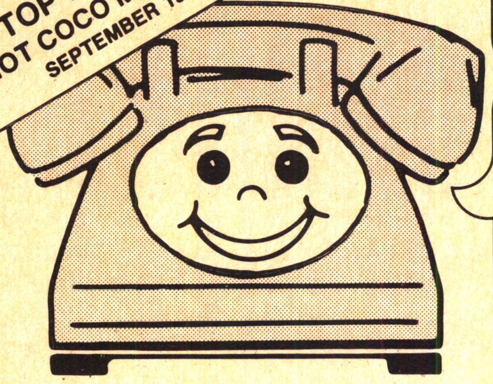
Finally, we are working on a big "surprise" for the show. No, I cannot tell you anything, except that if it does come off, it will be a very heartwarming addition to the lore of the CoCo Community.

* * *

As part of "finally," I keep hearing and seeing rumors of a new Color Computer. There is no doubt there really will be a new one, but probably not very soon. When it comes, though, I would not be at all surprised if we see a very important change in the low-end (price wise) part of the computer market.

So, if I am reading some of the signs right, you shouldn't be too impressed by anything else you see until you see what Tandy has to offer. I expect the CoCo Community to grow and prosper because of it.

— Lonnie Falk



TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984

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AND MOST LOVABLE

GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 46,600 characters (34,900 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

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Graham, *RAINBOW,* 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."
Banta, *HOT CoCo,* 9/84

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BUILDING MAY'S RAINBOW

Slashing Those Zeros . . .
The Rainbow On Tape Library . . .
And, A New Artist's Showcase . . .

OK OK, OK! We get the message. In your recent letters, you've made it abundantly clear that whatever type of printer we select for LLISTing programs for publication, it must have slashed zeros. So be it. In fact, we never considered doing anything else, even though recently we have experimented with a couple of daisy wheel printers without going to the trouble of writing a zero-slash software driver. Rest assured, though, that once we adopt a printer for RAINBOW listings — whether it be a dot matrix, daisy wheel or one of the new Hewlett-Packard LaserJet printers we just acquired — we will make sure it adds a slash to the zeros.

Aside from the lack of slashed zeros, the daisy wheel samplings have been very well received. Almost everyone who wrote us concluded that LLISTing with a daisy wheel is a big improvement over our present dot matrix printouts. Those who wrote in didn't care a bit for the three-column printouts, however. Based on the feedback you've provided, we plan to reserve our use of the three-column listing format to "have to" situations — times when, due to space limitations, we must resort to three columns per page or else not use that particular program at all. We plan to keep that usage to a bare minimum.

Next month we hope to run out a few listings on a laser printer (and slash those zeros). The laser just may be our answer, as it provides the printing speed of the fastest dot matrix printer with the correspondence quality printing of the best daisy wheels. With our volume of listings, speed is an essential ingredient.

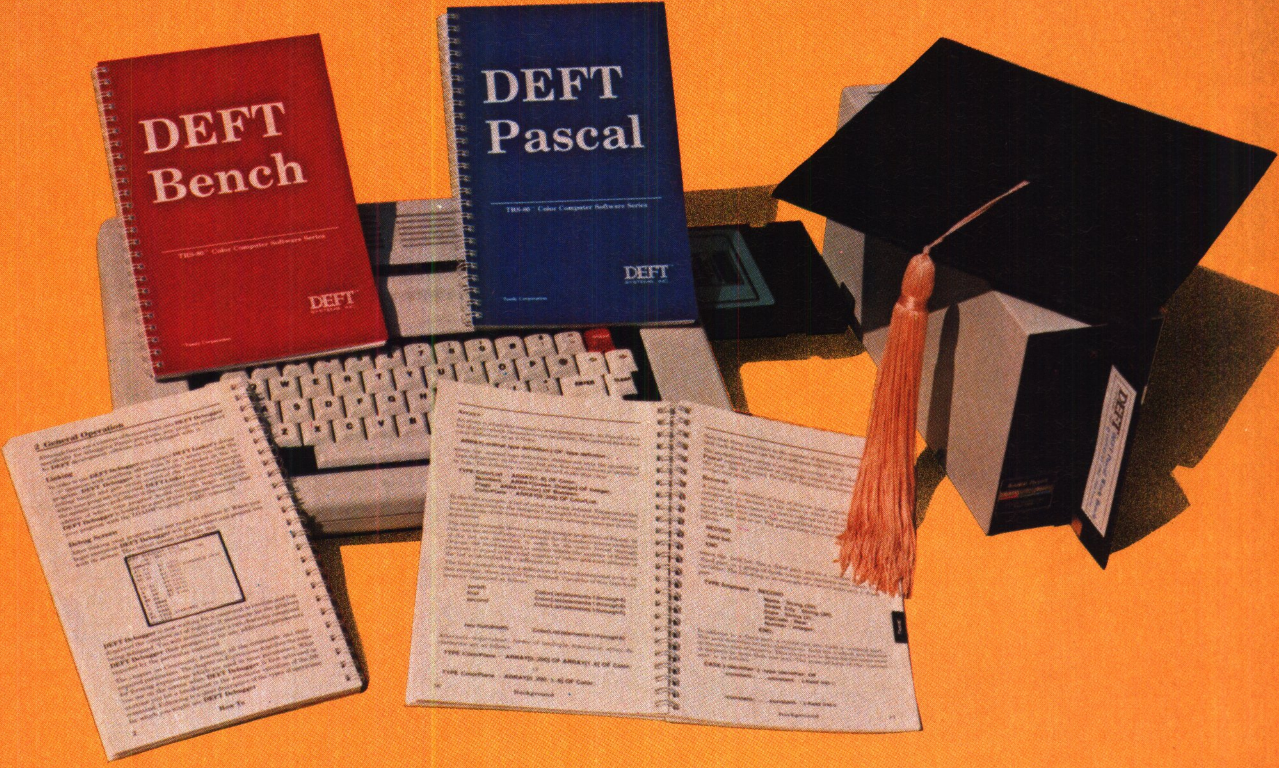
All this talk about printers seems apropos, since this is our third annual printer issue. And, while we have a full mix of printer-related articles and programs again this year, I do want to point out that the very program you're looking for may have been in last year's printer issue, or even the year before. So, you might want to check our RAINBOW ON TAPE ad on Page 71 for a rundown on what's available from past printer issues. As an adjunct to our editorial coverage each month, we are highlighting back issues of RAINBOW ON TAPE that pertain to the monthly theme. In our July anniversary issue, by the way, we will have a comprehensive listing of all RAINBOW ON TAPE programs, indexed by filename.

Among our offerings this month are two graphics screen print programs. Our budding CoCo artists should go for these and, if the resulting printout looks promising, maybe that special graphics creation should be submitted for publication in our new "CoCo Gallery" (see Page 162). We hope this new feature will become a creative outlet and continuing showcase for those with an artistic flair. While we called on three established Color Computer artists — Ana Landa Hutchison, Linda Nielsen and Eric White — to help us introduce this new department, it is open to professional and amateur alike, so send in that favorite CoCo creation to share with the world.

We want to share THE RAINBOW with the world, but we don't have everyone's address. If you'll send us yours, though, in the form of a subscription, we'll keep our printers busy all year long churning out more information for your Color Computer than is available from any other source.

— Jim Reed

Volume Price Breakthrough!!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GRAPHICS SCREEN DUMP

Pictures Perfect

When it comes to graphics screen dumps, the Prowriter and the Color Computer seem to be made for each other. Listing 1 (*Screen Dump*) is a short, nine-line program that will dump your `PMODE 3` or `PMODE 4` picture to your Prowriter printer. The result is a 2½-inch by 3½-inch printed image.

The program starts off by `CLEAR`ing room for string variables. Next, we set the printer for uni-directional printing and a line feed of $^{16}/_{144}$ inch with `PRINT#-2,CHR$(27);CHR$(62); CHR$(27)"T16"`. In Line 40, A$ will tell the printer that the next 192 characters will be for "bit image graphics."

Line 30 starts the loop that will look at the graphics page from right to left. Line 50 starts our main loop that will look at each column from top to bottom. In Line 60, we start to build B$, which will be 192 characters long. The first `PEEK` will be at (B+A) or 1536 + 31. This equals 1567 or the top-right corner of the graphics page.

The next time through the program will `PEEK` at 1536 + 31 + 32 (STEP). This equals 1599 which is the second byte down from the upper-right. This loop will continue until all 192 bytes in the first column are in B$.

We come out of this loop in Line 70 and send B$ to the printer with A$ in the front. Since each byte is eight bits long and the printhead is eight dots long, everything works out fine.

Back to Line 30 for our next value of 'A' until we have completed all 32 rows. When our screen dump is complete, Line 90 sets the Prowriter printer back to normal operations.

Listing 2 (*Large Screen Dump*) will make a picture that is 7 inches long by 4¾ inches wide; four times larger than the normal screen dump. To do this, we will need four dots per bit instead of one.

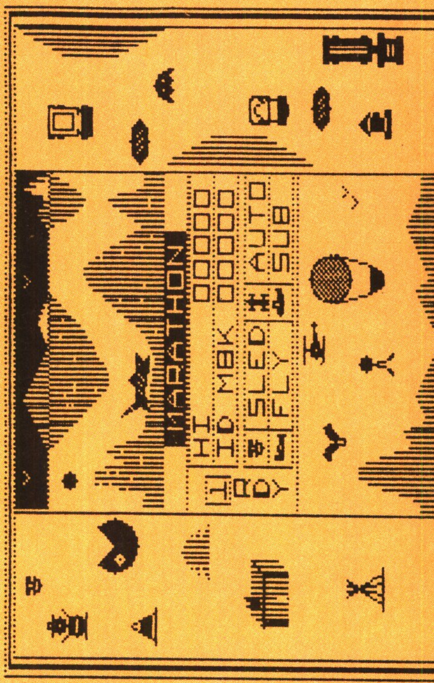
We can make two dots horizontally across the page for every one on our graphics page by going to the "Elongated Mode." This is done in Line 40 by `PRINT#-2,CHR$(14)`.

Making two dots vertically down the page is a little more complicated: We must take each byte and expand it to two bytes. Not just the same value twice, but a new expanded value.

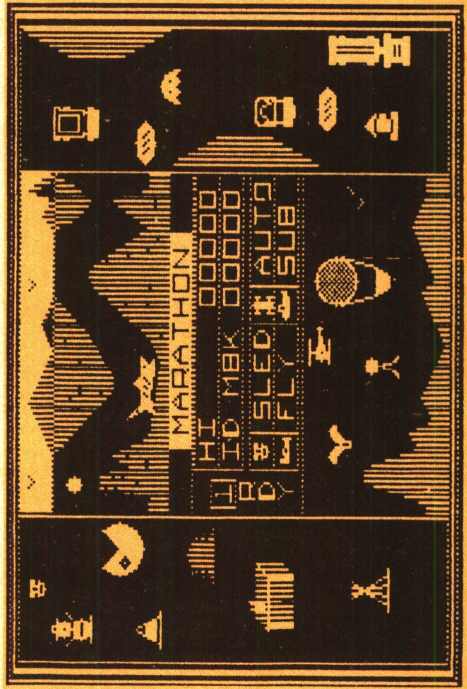
An example of this is the value 147. In binary, 147 equals 10010011. We must expand this value to make two

---

(Michael Kromeke holds an associate's degree in electronics engineering technology. He has worked for over 14 years as a technician with AT&T Communications. The past four years Mike has enjoyed writing programs for the CoCo. His other hobbies include photography and numismatics.)



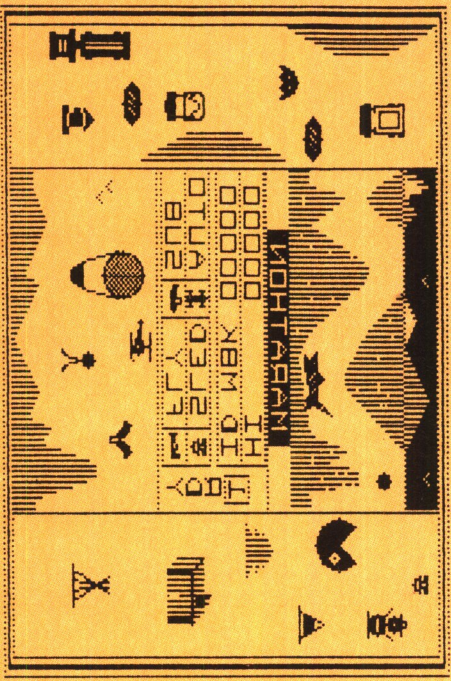
Normal Printout



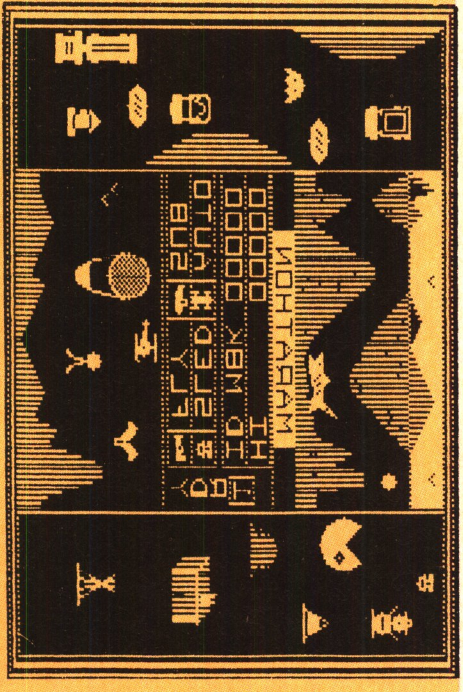
Normal Reverse

With Prowriter

By Michael B. Kromeke



Mirror Printout



Mirror Reverse

ones and two zeros for every old one.

That is, 1 0 0 1 0 0 1 1 must become

```
11000011 and 00001111
```

or 195 and 15.

We will make two passes at each byte and expand half of a byte to one full byte. Lines 70-90 look at the first half of each byte. 'C' is equal to the value of `PEEK(B+A) AND 15`. Let's use 147 as a example. This value is `AND`ed with 15.

```
        10010011 =147

AND     00001111 =  15
        ________
        00000011 =   3
```

When we expand 3 or 0011 to eight bits, we get 00001111 or 15. Lines 170-190 have the expanded values of zero through 15 in them (see Chart 1). These values were put into a dimension in lines 20 and 30.

On our second pass, we look at the same bytes again, lines 110-130. This time we want the second half of each byte. Our example of 147 is `AND`ed with 240.

```
        10010011 = 147
AND     11110000 = 240
        ________
        10010000 = 144
```

This is equal to 144. We then divide this by 16 to get back into the zero through 15 range, $^{144}/_{16} = 9$; 1001 is then expanded to equal 11000011 or 195. The rest of the program is exactly like our original screen dump.

We are not done yet. If you want a reverse print of your picture (make the white areas black and the black areas white), just change Line 60 in *Screen Dump* to:

```
60 B$=B$+CHR$(255-PEEK(B+A))
```

For reverse print in *Large Screen Dump*, change lines 90 and 130:

```
90 B$=B$+CHR$(255-D(C)):NEXT B
130 B$=B$+CHR$(255-D(C)):NEXT E
```

Now if you want mirror image of your picture, change Line 60 in *Screen Dump* to:

```
60 B$=CHR$(PEEK(B+A))+B$
```

And in *Large Screen Dump* change these lines:

```
90 B$=CHR$(D(C))+B$:NEXT B
130 B$=CHR$(D(C))+B$:NEXT E
```

That's all there is to it.

Printer Commands

CHR$(14) = Set Elongated Mode
CHR$(15) = Clear Elongated Mode
CHR$(27);CHR$(65) = Set 1/6-inch spacing between lines
CHR$(27);CHR$(60) = Bi-directional printing
CHR$(27);CHR$(62) = Uni-directional printing
CHR$(27)"T16" = Sets 16/144-inch spacing between line feeds
CHR$(27)+"S0192" = Next 192 characters will be in "bit image graphics"

Chart 1
Expanded Value Dimension Table

D(0)=0
D(1)=3
D(2)=12
D(3)=15
D(4)=48
D(5)=51
D(6)=60
D(7)=63
D(8)=192
D(9)=195
D(10)=204
D(11)=207
D(12)=240
D(13)=243
D(14)=252
D(15)=255

Binary to Decimal Conversion

Binary = 1 0 0 1 0 0 1 1
Decimal 1 6 3 1 8 4 2 0
Values 2 4 2 6 OR
8 1
128 + 16 + 2 + 1 = 147

Expanded Values in Binary

Number	Binary	Expanded Binary	Expanded Value
0	0000	00000000	0
1	0001	00000011	3
2	0010	00001100	12
3	0011	00001111	15
4	0100	00110000	48
5	0101	00110011	51
6	0110	00111100	60
7	0111	00111111	63
8	1000	11000000	192
9	1001	11000011	195
10	1010	11001100	204
11	1011	11001111	207
12	1100	11110000	240
13	1101	11110011	243
14	1110	11111100	252
15	1111	11111111	255

Color Chart for Printout

Screen Color		Printer Display
Green or Buff	=	White or Blank
Yellow or Cyan	=	Stripes
Blue or Magenta	=	Stripes
Red or Orange	=	Solid Black

AND Truth Table

0 AND 0 = 0
0 AND 1 = 0
1 AND 0 = 0
1 AND 1 = 1

Listing 1: *SCRNDUMP*

```
5 ' ***************************
6 ' *       SCREEN DUMP        *
7 ' *  FOR C.ITOH PROWRITER *
8 ' * BY MICHAEL B. KROMEKE *
9 ' ***************************
10 CLEAR500
15 GR=PEEK(186)*256+PEEK(187)
20 PRINT#-2,CHR$(27);CHR$(62);CH
R$(27)"T16"
30 FOR A=31 TO 0 STEP -1
40 A$=CHR$(27)+"S0192":B$=""
50 FOR B=GR TO GR+6143 STEP 32
60 B$=B$+CHR$(PEEK(B+A))
70 NEXT B:PRINT#-2,TAB(10)A$+B$
80 NEXT A:PRINT#-2:PRINT#-2
90 PRINT#-2,CHR$(27);CHR$(65);CH
R$(27);CHR$(60)
```

Listing 2: *LG DUMP*

```
5 ' ***************************
6 ' *   LARGE SCREEN DUMP    *
7 ' *  FOR C.ITOH PROWRITER *
8 ' * BY MICHAEL B. KROMEKE *
9 ' ***************************
10 CLEAR500:DIM D(15)
15 GR=PEEK(186)*256+PEEK(187)
20 FOR X=0 TO 15
30 READ A:D(X)=A:NEXT X
40 PRINT#-2,CHR$(14);CHR$(27);CH
R$(62);CHR$(27)"T16"
50 FOR A=31 TO 0 STEP -1
60 A$=CHR$(27)+"S0192"
70 FOR B=GR TO GR+6143 STEP 32
80 C=PEEK(B+A) AND 15
90 B$=B$+CHR$(D(C)):NEXT B
100 PRINT#-2,TAB(5)A$+B$:B$=""
110 FOR E=GR TO GR+6143 STEP 32
120 C=(PEEK(E+A) AND 240)/16
130 B$=B$+CHR$(D(C)):NEXT E
140 PRINT#-2,TAB(5)A$+B$:B$=""
150 NEXT A:PRINT#-2:PRINT#-2
160 PRINT#-2,CHR$(15);CHR$(27);C
HR$(65);CHR$(27);CHR$(60)
170 DATA 0,3,12,15,48,51,60
180 DATA 63,192,195,204,207
190 DATA 240,243,252,255
```

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See reviews in:
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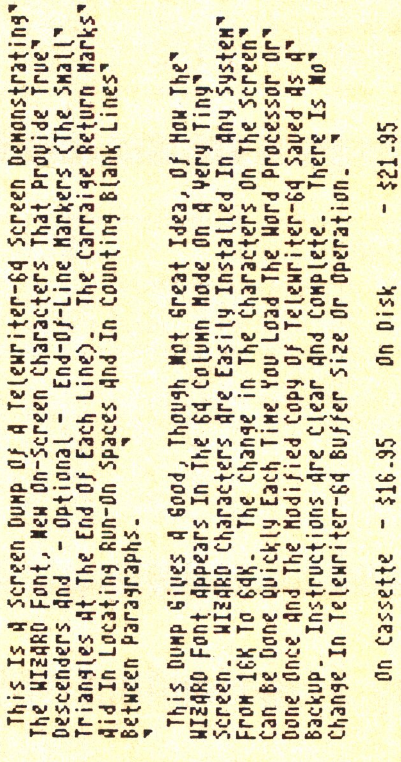

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See How Your Memory Stacks Against These Number Jacks

By Richard Ramella

This is a memory game which is simple enough for preschoolers to play, yet challenging even to adults. In my tests, I've found children often play *Numberjack* better than grown-ups.

Numberjack features high resolution animation and quick action. If you're a programmer, you may be interested in the `GET`-`PUT` techniques I used to give the game its bounce.

At the start of a run, simple instructions are given. There are five numbered boxes on the screen; they turn out to be jacks-in-the-box. The jacks pop out of boxes in random order. First, only one jack emerges. When a blue square appears at bottom-left of the screen, the player presses the number key corresponding to the box. The next sequence has two pop-ups, the next three, and so on as long as the player can remember the number sequences.

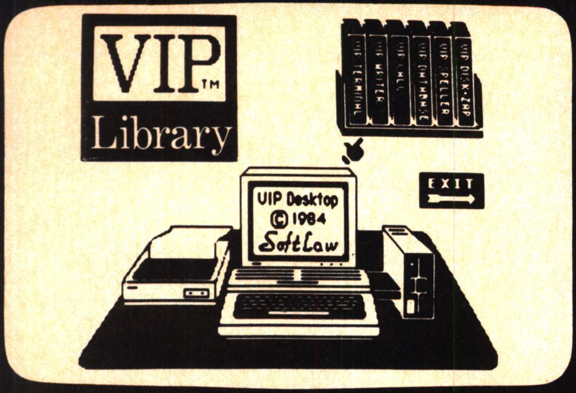
Brief distinctive melodies signal right and wrong answers. A right answer continues the game; a wrong answer brings up a score screen which shows the jack's pop-up sequence, the player's attempt and the score for the series. A prompt then asks if another game is wanted: A 'Y' starts the game or an 'N' ends the program run.

Numberjack may at first seem a simplistic game because the initial appearance of a jack lasts quite a long time. However, each increased number series is randomly different from the previous one, and jack appearances become briefer with random pauses built in to break the rhythm. A good player, one who may remember as many as 12 numbers in sequence, will be faced with split-second appearances and disappearances of the little figure.

Numberjack is a game, yet it has a serious intent. Recall of number series is a common part of mental testing done verbally. A series of 10 or 12 numbers may be recited to the student, who must repeat them. A series of six of more numbers may be recited with the request that the list be said in reverse order. Such testing can be an indication of short-term memory ability and anxiety level.

If you feel frustrated by the game, take heart. You're obviously already fairly good at number sequences. You know your address, telephone number, ZIP code and perhaps even your social security number. Of course, these involve long-term memory, but you might increase your score in *Numberjack* by trying to remember the series like a telephone number: five-five-five seventy-four, twenty-one, for example.

(Richard Ramella has written two books and numerous articles on TRS-80 topics. He is a writer for a California hospital.)



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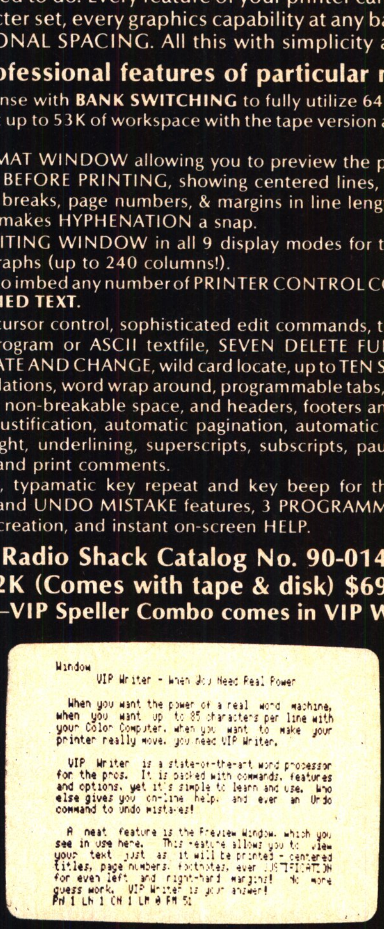

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PN 1 LN 1 CN 1 LM 0 FM 51
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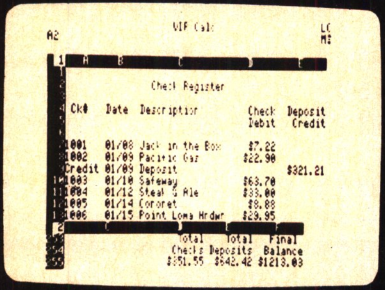

```
A2                    VIP Calc                    LC
                                                  M:
 1   A      B          C          D        E
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 2              Check Register
 3
 4 Ck#    Date  Description         Check  Deposit
 5                                  Debit   Credit
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The animation and speed of the game result from `GET-PUT` graphics, with which rectangular screen areas may be stored in two-dimensional arrays and printed to different positions on a high resolution screen. Your Color Computer manual is the best source for an explanation of how to dimension arrays, to `GET` screen areas and `PUT` them elswhere.

In the *Numberjack* program, I used `CIRCLE`, `LINE`, `DRAW` and `PAINT` commands in lines 230-520 to create several different versions of the popping up and down animation. First stage is a closed box. Insert a line `255 GOTO 255` and run the program to see the box that Line 260 `GET`s into the A(1,25) array. To continue, delete Line 255 and make a line `355 GOTO 355` to see another stage. A line `395 GOTO 395` will show more progress.

In play, the animation sequence of the stages occurs from lines 580-650. It is nothing more than a 1-2-3-2-1 repetition of positions: closed box, half-open box with the jack peeping out, open box with the jack fully apparent, and a reverse of that sequence.

The only tricky thing here is the number atop the box is put in a `GET` array at the start so it can be replaced as the lid of the box falls shut. `GET-PUT` makes it happen very quickly, so quickly in fact, that timer loops must be used to slow the action.

```
240 ......221
420 ......197
570 .......18
END .....179
```

The listing: *NMBRJACK*

```
100 REM * NUMBER JACK * TRS-80 E
XTENDED COLOR BASIC 16K / RAMELL
A
110 CLEAR 256: CLS: PMODE 3,1: P
CLS 1: COLOR 3,1
120 PRINT "*YOU WILL SEE FIVE BO
XES.": PRINT
130 PRINT "*NUMBER JACK POPS OUT
 OF"
140 PRINT " BOX 1, 2, 3, 4 OR 5.
": PRINT
150 PRINT "*REMEMBER THE BOX NUM
BERS.": PRINT
160 PRINT "*WHEN YOU SEE THE BLU
E SQUARE,"
170 PRINT " TAP NUMBER KEYS 1 TO
 5 IN"
180 PRINT " SAME ORDER JACK JUMP
S.": PRINT
190 PRINT "*YOU GET 1 POINT FOR
EACH"
200 PRINT " BOX NUMBER YOU REMEM
```

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```
BER."
210 PL$="T8;O4;GECAFD"
220 DIM A(1,25), B(1,25), C(1,25
), D(1,25)
230 FOR Y=80 TO 50 STEP -1
240 N=N+2: DRAW"BM3,"+STR$(Y)+"C
"+STR$(N)+"R30E12": IF N=6 THEN
N=0
250 NEXT: DRAW "BM45,38;L30G12R3
0": PAINT(20,45),3,2
260 GET(0,38)-(40,80),A
270 DRAW"BM45,38;U30L30D30R1C1R2
5": PAINT(20,45),1,2
280 COLOR 4,1: CIRCLE(22,49),15,
,1.5,.5,.98
290 CIRCLE(18,20),10: PAINT(18,1
8),1,4
300 DRAW"BM13,49;R18E3"
310 FOR X=15 TO 22 STEP 7: CIRCL
E(X,17),2,3: NEXT
320 CIRCLE(18,23),5,,.5,0,.5
330 DRAW"C4;BM30,32;E4U13R7D15G1
1C1L20C4H12U8R6D8F12"
340 COLOR 2,1: LINE(11,35)-(34,3
5),PRESET: PAINT(20,35),4,4
350 CIRCLE(4,18),4,3: CIRCLE(38,
12),4,3
360 GET(0,8)-(45,50),B: PCLS1: P
UT(0,38)-(40,80),A
370 PAINT(20,45),1,2: DRAW"BM44,
38;H10L40F10R2C1R30"
380 COLOR 3,1: CIRCLE(21,45),10,
4
390 FOR X=17 TO 24 STEP 7: CIRCL
E(X,44),2,3: NEXT X
400 GET(0,8)-(45,50),D: PCLS1
410 N=1500: H=70: J=112: FOR X=0
 TO 192 STEP 48
420 PUT(X,100)-(X+40,142),A: NEX
T
430 C=1: FOR X=0 TO 50: C=C+1: D
RAW "C"+STR$(C)+";BM0,"+STR$(X)+
";R240": IF C=4 THEN C=1
440 NEXT: COLOR 1,1: LINE(10,40)
-(10,10),PSET: LINE-(30,40),PSET
: LINE-(30,10),PSET
450 DRAW"BM36,23;D14F3R8E3U14":
DRAW"BM57,23;D17U14E3R4F3D14U14E
3R4F3D14"
460 DRAW"BM81,10;D30R13E3U10H3L1
3": DRAW"BM101,30;R13U3H3L8G3D10
F3R9E3"
470 DRAW"BM121,24;D16U11E3R8F3":
 DRAW"BM167,10;L3R6L3D25G5L12H3U
8L2R4"
480 DRAW"BM185,24;D16R3L3U4G4L8H
```

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```
3U10E3R8F3": DRAW"BM205,27;H3L8G
3D10F3R8E3"
490 DRAW"BM211,10;D30U10E11G11E3
D2F5D2F5": COLOR 3,1
500 DRAW"BM23,85;E3D13L2R4": DRA
W"BM71,85;E3R6F3D3G2L8G3D3R12"
510 DRAW"BM119,85;E2R6F2D2G2L5R5
F2D3G2L6H2": DRAW"BM173,97;U15G9
R15"
520 DRAW"BM225,83;L8D6R5F2D3G2L5
H2": COLOR 3,1: PRINT: PRINT "TA
P A KEY TO PLAY"
530 X$=INKEY$: IF X$="" THEN 530
540 SCREEN 1,1: FOR T=1 TO 1000:
 NEXT T
550 R=1: Q=1
560 M$="": K$="": FOR L=1 TO R
570 B=RND(5): X=B*48-48
580 GET(X,H)-(X+40,J),C
590 PUT(X,H)-(X+40,J),D
600 FOR T=1 TO N/5/Q: NEXT T
610 PUT(X,H)-(X+40,J),B
620 FOR T=1 TO N/Q: NEXT T
630 PUT(X,H)-(X+40,J),D
640 FOR T=1 TO N/5/Q: NEXT T
650 PUT(X,H)-(X+40,J),C
660 IF L<>R THEN FOR T=1 TO RND(
N/2): NEXT T
670 M$=M$+RIGHT$(STR$(B),1): NEX
T L
680 LINE(0,170)-(20,190),PSET,BF
690 C$=INKEY$: IF C$="" OR INSTR
("12345",C$)=0 THEN 690
700 K$=K$+C$: IF K$=M$ THEN PLAY
 PL$: GOSUB 800: R=R+1: Q=R: S=S
+LEN(M$): GOTO 560
710 IF K$<>LEFT$(M$,LEN(K$)) THE
N 720 ELSE 690
720 PLAY "T8;O1;GD#CGD#C": CLS:
PRINT "JACK: "M$
730 PRINT " YOU: "K$
740 S=S+LEN(K$)-1: PRINT: PRINT
"SCORE:"S
750 IF S>HS THEN HS=S
760 PRINT " HIGH:"HS
770 PRINT: PRINT "PLAY AGAIN <Y>
ES OR <N>O"
780 Z$=INKEY$: IF Z$<>"Y" AND Z$
<>"N" THEN 780
790 IF Z$="Y" THEN GOSUB 800: S=
0: SCREEN 1,1: FOR T=1 TO 1000:
NEXT T: GOTO 550 ELSE END
800 LINE(0,170)-(20,190),PRESET,
BF: RETURN
810 END
```

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Expanding The Computer's Role In Student Testing

By Michael Plog, Ph.D.
Rainbow Contributing Editor

In the spring of each year, students all over the country take achievement tests. Parents are called into school to see the results of these tests, and to understand how their children performed on instruments that might influence future school experiences and careers.

Tests are generally given for three major purposes. The first is for assessment — to get an idea of how well students know a subject matter, such as social studies, science, etc. Another major purpose is for screening, to determine what additional information is needed before making a decision about the student. A third purpose of testing is for diagnosis, to identify specific strengths or weaknesses of students and plan an educational experience accordingly.

There are three types of achievement tests, each measuring achievement in different ways. First, there are criterion-referenced tests. Each item (question) on a criterion-referenced test is related to at least one specific objective of a curriculum (for example, learning to add two-digit numbers).

There is a standard, or criterion, for determining successful performance on the test. If a student gets 80 percent of the items correct, that student has mastered the objective being measured and is ready to go on to a higher objective (possibly learning to multiply two-digit numbers).

Criterion-referenced tests are especially useful to classroom teachers for planning instruction for students. The information from the test concerns student mastery, not how well the student performed in relationship to other students.

The second type of achievement tests are classified as objective-referenced tests. They are similar to criterion-referenced tests in that each test item is associated with a specific objective of the curriculum. Objective-referenced tests, however, are not used with predetermined standards or criteria for successful performance. These tests are especially useful for determining student placement. Also, objective-referenced tests can be used to obtain an overall perspective of student growth for a classroom or a district.

The third type of achievement test is called norm-referenced. These tests compare performance of an individual student (or even a large group of students) with the performance of a "norming" group for the tests. Generally, the norming group should be students across the entire country. Items on the test may be grouped into subtests (i.e., mathematics, science, etc.), but are not related to specific objectives of a curriculum.

Norm-referenced tests are used to compare an individual student with the "typical" student taking the test. They can be used for screening purposes by identifying students in relationship to other students taking the test. Thus, those students who score either very high or very low on the test may be eligible for different types of programs.

So far we have used the term "referenced" while talking about tests. This term merely means what the test is related to — a specific criterion, an objective or a norming population.

Most tests given in schools are prepared by teachers. These are given frequently during the year and are normally used to help the teacher assign grades or determine what students need what kind of help.

Commercial tests are also used by schools for many purposes. These tests are purchased from test companies, and

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

can be either criterion-, objective- or norm-referenced. Most commercial tests are "standarized," meaning the administration and scoring procedures are standard for all students taking the test, no matter where in the country that student is.

Commercial tests can be valuable for school personnel, but must be used with caution. These tests have been designed for specific purposes, and are not appropriate in some situations. All such tests come with manuals which explain the correct and incorrect purposes of the test.

It is fair to say that the widespread use of commercial (and especially standardized) tests is a result of computers. Without the number crunching ability of computers, most commercial achievement tests would never have been developed.

The role of the computer in testing is expanding. Part of this expansion is due to the microcomputer. We no longer need large mainframes to deal with achievement tests. In general, there are three roles the computer plays in testing: scoring, analysis and administration.

Most commercial tests given today use "mark sensitive" scoring answer sheets. Students mark their answers on a special sheet containing "bubbles." The sheets are then fed into machines that "read" which bubbles were marked by the students. Student responses go directly into the memory of the machine and then to permanent storage, such as a diskette or tape.

It is possible today for a school system to purchase a test-reading machine to connect with the Color Computer, or almost any microcomputer. Some districts even encourage their teachers to administer classroom tests using these answer sheets and score them on the microcomputer located in the school building. The whole set of hardware (computer, disk, reading machine and printer) can be put on a cart and transported to classrooms. Students have results of their tests before a class period is over; they can no longer count on parents forgetting they took an exam before the scores are ready.

Computers are a "natural" for analysis of test results. Norms for tests can easily be obtained in a short time for a classroom, building, entire district or even several districts giving the same test. Graphics output of individual student results, or groups of students, can be easily ordered and examined. When giving a criterion-referenced test, it is a simple matter to determine which students have mastered specific objectives at a glance.

Possibly the greatest expansion of the use of computers in testing is with the administration of tests. Instead of having a teacher stop all classroom work and give a test, students can now be assigned to go to a microcomputer, take a test and return to class. Questions appear on the screen and students type their choice of answers on the keyboard. A permanent record of each answer can be saved on diskette, and the student can be given the score for the test immediately after responding to the last question.

But, using computers for administration of tests can go beyond this simple example. Consider administration of a criterion-referenced test. The purpose of the test is to determine student mastery of a given body of content. Instead of determining mastery by the

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answers to a few (generally less than five) test items, it is possible to use many test items to determine the developmental point of an individual student.

A computer program (and diskette) can contain over a thousand questions. The computer program begins with a few key items, then determines which items should be asked next, based on student responses. If the student gets three consecutive questions wrong, the computer goes to simpler questions. If the student gets three consecutive questions correct, the computer skips the next few questions and presents harder items.

After going through several groups of items, the computer can determine, with as much accuracy as the questions allow, the level of knowledge for each specific student. It becomes much easier for the teacher to then determine what lessons should come next for that special student.

This type of testing (and curriculum) depends on a lot of advance work to determine a sequence of knowledge in a subject matter. The authors of the computer program must know — in painful detail — the sequence of the educational program.

There is one other example of creative use of a microcomputer for administration of tests. Science teachers have stressed the importance of learning the process of science. Our test instruments, however, have stressed the product of learning. Based on student responses to most science tests, it is impossible to determine how a student arrived at that answer and what information a student used to make scientific inferences.

An innovative microcomputer program has been written to attempt to examine the process a student uses to arrive at answers for a science test. The program presents the student with a series of simulations. (We will use a plant growth simulation for illustration.)

The student is required to make observations, organize data, develop and test hypotheses, make predictions based on data, make inferences, and identify a scientific model that accounts for most of the data presented. In essence, the student must know the scientific method in order to progress through the simulation appropriately.

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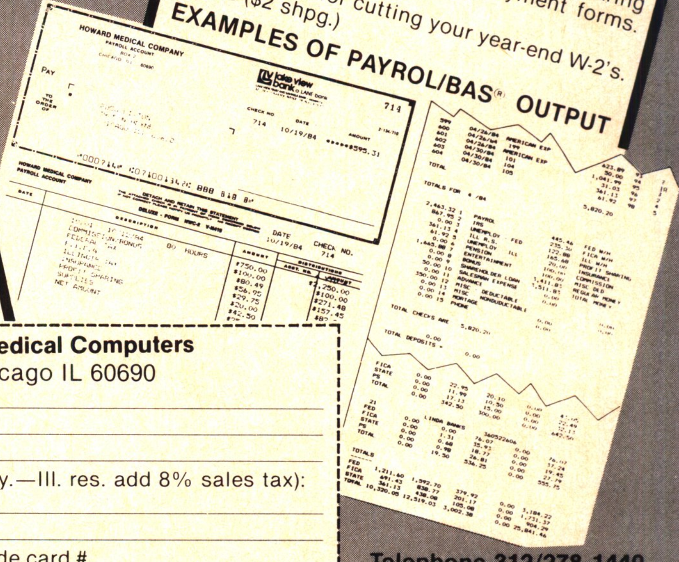

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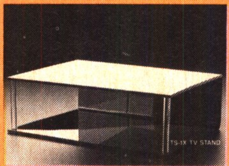

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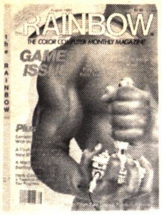

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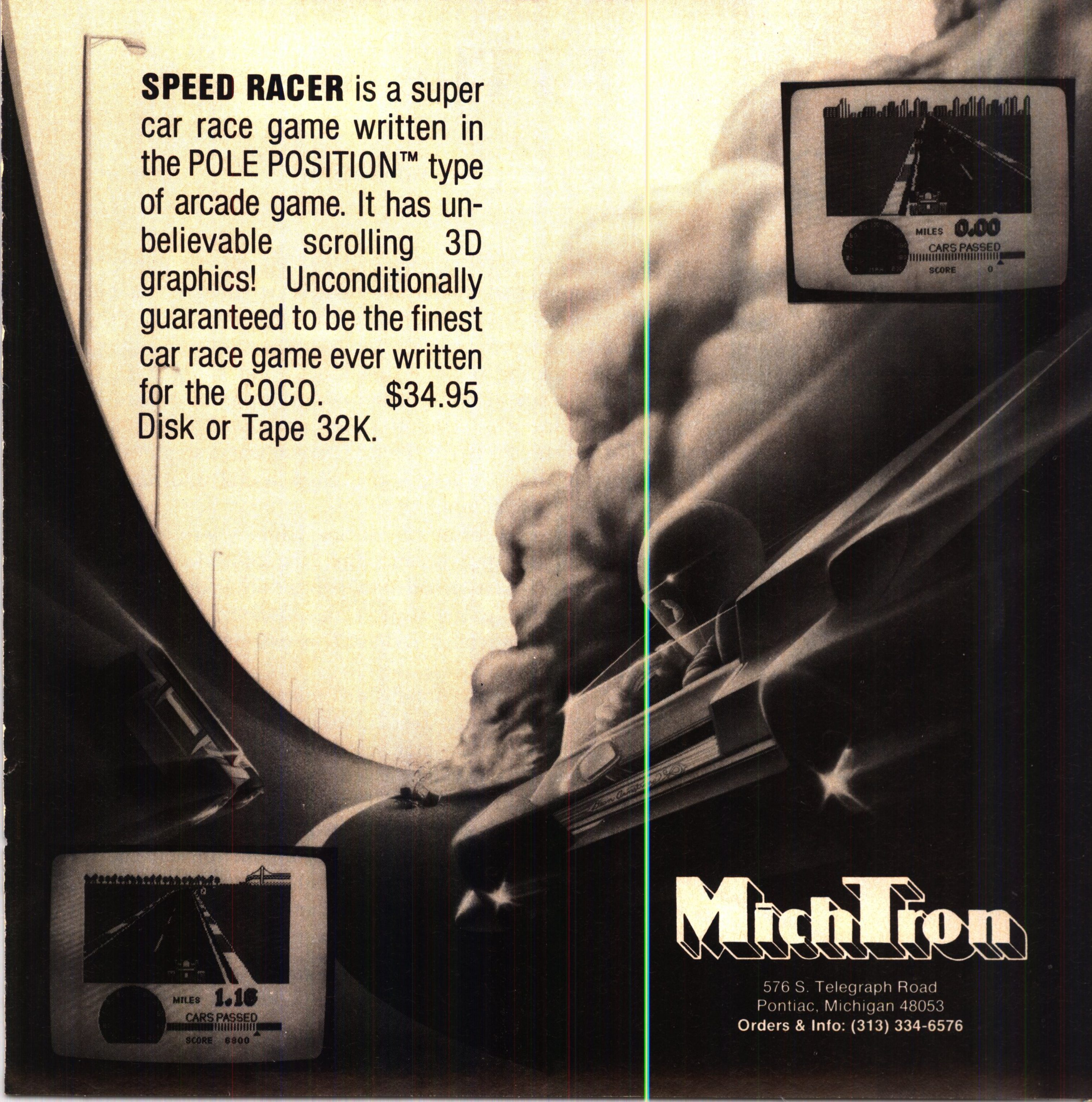
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DIRECT

To The Rescue

By Ed Hetzler

During the eight months that I've had my computer, I have accumulated numerous tapes. One thing I had not yet acquired (or seen for that matter) was a decent program for cataloging tapes.

I had been using the indexing function of *Clone 80C*, but it gave a very crude printout. There was a program printed in the January 1984 issue of *Color Computer Magazine* titled *CASSDIR*, by Byron Palmer, which was a step in the right direction, but still didn't give much useful information and created only a bare bones printout.

The end result of all this is that I finally wrote a directory program of my own because my tape collection was getting out of hand. (I have a bad habit of spending the money I am supposedly saving for a disk drive on software!)

This program, called *DIRECT*, is original, though the idea is not.

The program contains a complete set of instructions and is self-prompting. Just `CLOAD` and `RUN`, and the first thing you will see is a blue screen with the title. After a short interval, you will be asked if you want instructions. Press 'Y' if you do and 'N' if you don't.

If you choose the instructions, the program will automatically call up four instruction screens. These are timed for you to read. The timers in lines 1130, 1180, 1230 and 1270 can be adjusted to your own reading speed if mine are too fast or slow for you.

(Ed Hetzler works as a fire protection consultant and holds a bachelor's degree in chemistry. He lives on a small farm south of Pittsburgh, Pa., with his wife, nine dogs, four cats and a horse.)

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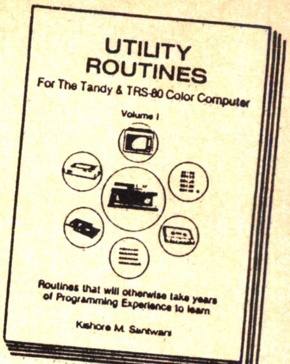

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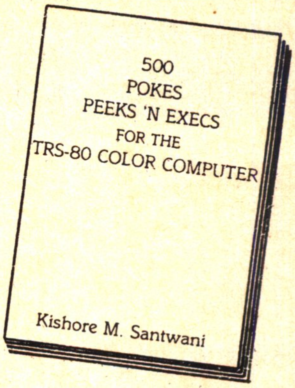

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Sample Printout

```
FILENAME    TYPE     COMMAND    CODE       START    EXEC      REMARKS
WATERLOO    BASIC    CLOAD     BINARY
MAP         MACHL    CLOADM    BINARY       3800     3800
NAPOLEON    MACHL    CLOADM    BINARY      32720    32720
FEMBOT      MACHL    CLOADM    BINARY        159      159
 LOADING ERROR !!!
é⧗⧗◢Q⧗⧗⧗    UNKNOWN OR ILLEGAL FILE TYPE
    LOADING ERROR !!!
CKBK8405    DATA               ASCII
```

The program then loops back to the "Do you want instructions?" screen.

After you have read the instructions and are ready to start, press 'N.' This will cause the program to present you with a series of prompts: Is your printer on? Is your recorder on? Is your recorder loaded? etc. This may sound tedious, but it assures that you don't forget anything.

Finally, you are asked to type in the title of the cassette you want read. After doing this, press ENTER; then you can sit back and relax!

First, a message flashes on the screen telling you that the printout is being formatted, then the printer will start and last, your recorder will start. As soon as the program encounters a file on the tape, the filename will appear on the screen and the printer will print out all applicable information.

If an error occurs, an error message will be printed in your directory, the recorder will click on and off, and the program will proceed to the next good file. At the end of the tape, you must manually turn off the recorder.

If you want to create a new title, reset and rerun the program, otherwise insert a new tape, press the Play button and your directory will continue.

DIRECT is written for a Radio Shack DMP 120 printer. The printer codes are located in lines 230 (start elongation), 240 (end elongation), 280 (print graphics), 290 (prints heavy line) and 300 (print characters).

The sample printout demonstrates the various responses the program makes. I deliberately included the "FEMBOT" tape in the example to show how the program responds to some methods of copy protecting.

The start and execute addresses of the ML programs in the directory happened to be identical. If they are different, they will show up differently. I wanted to include a listing of the end address, but I couldn't find it. `PEEK(126)*256+PEEK(127)-1` doesn't work. All it returns is the end address of the ROM routine I used to load the buffer.

I've found *DIRECT* suits my needs nicely (no more FM Errors because I can't remember whether to `CLOAD` or `CLOADM`) and gives me a neatly formatted directory I can put in a loose-leaf folder.

(For anyone having questions, Mr. Hetzler may be reached at P.O. Box 35, Eighty Four, PA 15330.)

200 188
400 77
1000 7
1150 121
END 93

The listing: *DIRECT*

```
10 'TAPE DIRECTORY BY ED HETZLER
20 'P.O. BOX 35
30 'EIGHTY FOUR, PA.   15330
40 'JULY 1984
50 '
60 '
70 GOTO1000
100 CLS:PRINT@166,"IS YOUR PRINT
ER READY?":PRINT@269,"<enter>"
110 A$=INKEY$:IF A$=""THEN110
120 IF A$=CHR$(13)THEN130 ELSE 1
10
130 CLS:PRINT@164,"IS YOUR CASSE
TTE LOADED?":PRINT@269,"<enter>"
140 A$=INKEY$:IF A$=""THEN 140
150 IF A$=CHR$(13)THEN160 ELSE 1
40
160 CLS:PRINT@128,"DEPRESS PLAY
BUTTON ON RECORDER!"
170 PRINT@227,"DO YOU WANT THE A
UDIO ON?":PRINT@332,"yES/nO"
180 A$=INKEY$: IF A$="" GOTO180
190 IF A$="Y"THEN 195 ELSE IF A$
="N" THEN 200 ELSE GOTO180
195 AUDIO ON
200 CLS:PRINT@128,"TYPE IN CASSE
TTE TITLE: <enter>"
210 PRINT:INPUTCT$
220 PRINT#-2:PRINT#-2
230 PRINT#-2,CHR$(27)CHR$(14)
240 PRINT#-2,"      "CT$:PRINT#-2
,CHR$(27)CHR$(15):PRINT#-2:PRINT
#-2
```

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```
250 PRINT@37,"formatting index n
ow!!!"
260 PRINT@257,"file in buffer
 memory left":PRINT@416,"press <
RESET> to stop at end of current
 tape."
270 PRINT#-2:PRINT#-2,"
 FILENAME   TYPE    COMMAND   CO
DE     START   EXEC    REMARKS"
280 PRINT#-2,CHR$(18);
290 FOR C=1TO230:PRINT#-2,CHR$(2
33);CHR$(234);:NEXT
300 PRINT#-2,CHR$(30)
305 PRINT@37,"reading tape files
 now!!!"
310 POKE126,1:POKE127,218
320 EXEC 42753
330 A=PEEK(124):IFA=255 THEN520
340 IF A<>0 AND N=0 THEN PRINT#-
2,"           LOADING ERROR !!!"
350 IF A<>0 THEN N=N+1:GOTO320
360 N=1
370 PRINT#-2,"           ";:FOR I
=474TO481:PRINT#-2,CHR$(PEEK(I))
;:NEXT I
380 PRINT@323,;:FOR I=474TO481:P
RINTCHR$(PEEK(I));:NEXT I
390 TY=PEEK(482):PRINT#-2,"    ";
400 IF TY=0 THEN PRINT#-2,"BASIC
   CLOAD ";
410 IF TY=1 THEN PRINT#-2,"DATA
         ";
420 IF TY=2 THEN PRINT#-2,"MACHL
   CLOADM";
430 IF TY>2 THEN PRINT#-2,"UNKNO
WN OR ILLEGAL FILE TYPE"
440 CD=PEEK(483):PRINT#-2,"   ";
450 IF CD=0 AND TY=2  THEN PRINT
#-2,"BINARY";
451 IF CD=0 AND TY=0 THEN PRINT#
-2,"BINARY"
460 IF CD <> 0 AND TY=2 THEN PRI
NT#-2,"ASCII ";
461 IF CD <> 0 AND TY=1 THEN PRI
NT#-2,"ASCII"
462 IF CD<>0 AND TY=0 THEN PRINT
#-2,"ASCII"
470 IF TY=2 THEN 480 ELSE 520
480 ST=PEEK(487)*256+PEEK(488)
490 PRINT#-2,"   ";:PRINT#-2,USI
NG"#####";ST;
500 EX=PEEK(485)*256+PEEK(486)
510 PRINT#-2,"   ";:PRINT#-2,USI
NG"#####";EX
520 PRINT@341,MEM
530 GA=PEEK(484)
540 IF GA<>255 GOTO600
600 EXEC42705:N=-1:GOTO320
1000 CLS3:X=24:DIM LO(25),TI(25)
1010 DATA 102,84,103,65,104,80,1
05,69,176,68,177,73,178,82,179,6
9,180,67,181,84,182,79,183,82,18
4,89
1020 DATA 400,2,401,25,403,5,404
,4,406,8,407,5,408,20,409,26,410
,12,411,5,412,18
1030 FOR C=1TOX:READ LO(C),TI(C)
:NEXT C
1040 FOR C=1TOX:POKE(1024+LO(C))
,TI(C):NEXT
1050 FOR T=1TO1000:NEXTT
1060 CLS:PRINT@164,"DO YOU WANT
INSTRUCTIONS?":PRINT@237,"yES/nO
"
1070 A$=INKEY$:IFA$=""GOTO1070
1080 IFA$="Y"THEN 1090 ELSE IF A
$="N"THEN 100 ELSE GOTO1070
1090 CLS:PRINT@40,"**instruction
s**"
1100 PRINT@100,"THIS PROGRAM WIL
L READ ANY  TAPE AND PRINT OUT A
```

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```
 LIST OF ALLPROGRAMS ON THE TAPE
 FOR PERMAN-ENT RECORD. A PRINTE
R IS REQUIR-ED.
1110 PRINT@260,"THE PROGRAM DIST
INQUISHES BETWEEN BASIC AND MACH
INE LANGUAGEPROGRAMS AND BETWEEN
 BINARY AND ASCII CODE. IT WILL
TELL YOU IF A PROGRAM SHOULD BE
CLOAD(ED) ORCLOADM(ED)."
1120 PRINT@458,"**page one**"
1130 FOR T=1TO9000:NEXTT
1140 CLS:PRINT@40,"**instruction
s**"
1150 PRINT@100,"THE PROGRAM WILL
 REMIND YOU TO TURN ON YOUR PRIN
TER, LOAD   YOUR RECORDER, TURN
IT ON ETC., BY MEANS OF PROMPTS
DURING EXE- CUTION."
1160 PRINT@260,"IF A LOADING ERR
OR OCCURS   WHILE THE PROGRAM IS
 READING, ITWILL SKIP THE ERROR
AND CONTINUEEXECUTING. YOUR PRIN
TOUT WILL   SHOW AN ERROR MESSAG
E."
1170 PRINT@458,"**page two**"
1180 FOR T=1TO9000:NEXTT
1190 CLS:PRINT@40,"**instruction
s**"
1200 PRINT@100,"IF THE PROGRAM E
NCOUNTERS A TAPE ERROR OR FILE T
YPE IT DOES NOT RECOGNIZE, IT WI
LL PRINT THEWORD 'UNKNOWN' AND C
ONTINUE EXE-CUTING.";
1210 PRINT" YOUR TAPE RECORDER W
ILL CLICK ON AND OFF RAPIDLY WHE
N ANERROR OCCURS MUCH LIKE IT DO
ES  WHEN READING ASCII FILES. TH
IS  IS NORMAL."
1220 PRINT@457,"**page three**"
1230 FOR T=1TO9000:NEXT T
1240 CLS:PRINT@40,"**instruction
s**"
1250 PRINT@100,"WHEN THE END OF
THE TAPE IS REACHED, YOU MUST MA
NUALLY STOP THE PROGRAM BY PRESS
ING THE RE- SET BUTTON. TO READ
ANOTHER TAPESIMPLY RE-RUN THE PR
OGRAM."
1260 PRINT@457,"**page four**"
1270 FOR T=1TO7000:NEXT T
1280 GOTO1060
```

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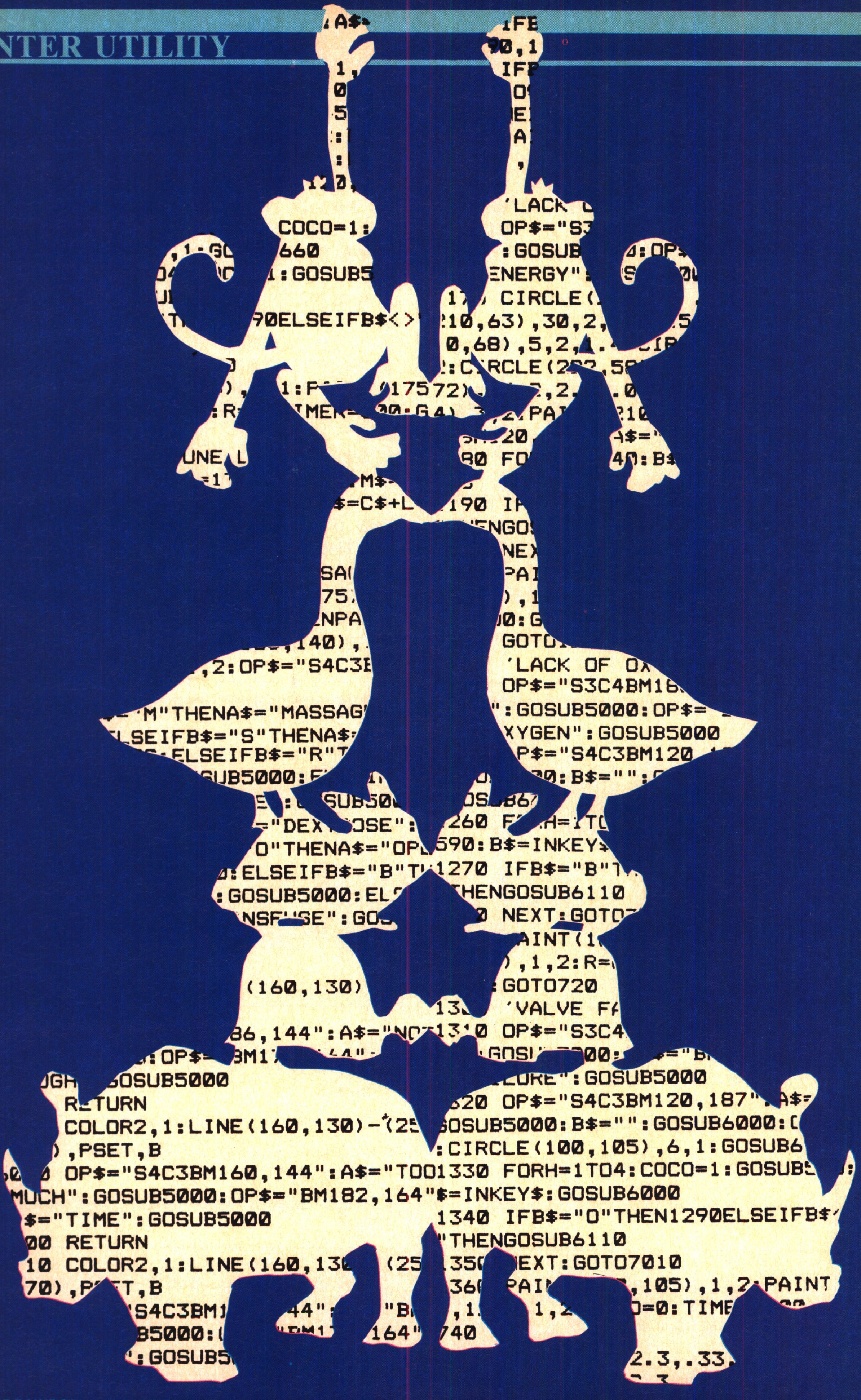

COCO=1:
660
1:GOSUB5
90ELSEIFB$<>"
'LACK
OP$="S3
:GOSUB
ENERGY"
CIRCLE(
210,63),30,2,
0,68),5,2,
:CIRCLE(2
(17572)
120
M$=
$=C$+L
190 IF
ENGOS
NEX
PAI
GOTO
140),
,2:OP$="S4C3E
'LACK OF OX
OP$="S3C4BM16
M"THENA$="MASSAG
":GOSUB5000:OP$=
LSEIFB$="S"THENA$=
XYGEN":GOSUB5000
ELSEIFB$="R"T
P$="S4C3BM120
GUB5000:
=0:B$="":G
="DEX
OSE":
260 FO
H=1TO
"O"THENA$="OP
590:B$=INKEY$
:ELSEIFB$="B"T
1270 IFB$="B"T
:GOSUB5000:EL
THENGOSUB6110
NSE
SE":GO
NEXT:GOTO
AINT(1
),1,2:R=
(160,130)
GOTO720
'VALVE F
86,144":A$="NO
OP$="S3C4
:OP$=
BM17
GOSUB5000
LURE":GOSUB5000
RETURN
620 OP$="S4C3BM120,187":A$=
COLOR2,1:LINE(160,130)-(25
GOSUB5000:B$="":GOSUB6000:
),PSET,B
:CIRCLE(100,105),6,1:GOSUB6
OP$="S4C3BM160,144":A$="TOO
1330 FORH=1TO4:COCO=1:GOSUB5
MUCH":GOSUB5000:OP$="BM182,164"
$=INKEY$:GOSUB6000
$="TIME":GOSUB5000
1340 IFB$="O"THEN1290ELSEIFB$
00 RETURN
"THENGOSUB6110
10 COLOR2,1:LINE(160,130
(25
1350 NEXT:GOTO7010
70),PSET,B
1360 PAIN
,105),1,2:PAINT
"S4C3BM1
44"
"B
1,2
=0:TIME
B5000:
164"
740
":GOSUB5
2.3,.33,

Neat Little Columns Two -By- Two

By Stephen Lai

When I bought a printer, the first thing I did to test it was `LLIST` a program. The quality of the printing really looked fine, but the program listing was terrible! The lines were jagged at the right side of the sheet and the listing didn't stop for page breaks.

I wanted my listings to look as refined and neat as those that are printed in the RAINBOW magazine, so I decided to write *Two-Column Program LLISTer*. This program requires 16K Extended Color BASIC, a disk drive and a printer with at least 80 columns. I use it every time I make a hard copy of any BASIC program because it provides me with single sheet, easy-to-read two-column program `LLIST`ings.

This program is fairly easy to run. First type in and save *Two-Column Program LLISTer*. Next, find the program that you wish to `LLIST`. If it's saved in ASCII, go on to the next step; if not, `LOAD` the program and `SAVE` it again, but this time in ASCII (e.g., `SAVE"PROGRAM",A`). After that is done, `RUN` *Two-Column Program LLISTer*.

Upon running the program, you will be greeted with a few questions about the program that is to be `LLIST`ed. First, it asks for the disk-saved name. If you include an extension, use a slash instead of a period or else the program won't recognize it; if you don't include an extension, the program will assume the extension is /BAS.

Next, enter the full name of the program; the disk-saved name was limited to eight characters plus three more for extensions, but this name, which is printed as the title of the `LLIST`ing, is only limited to the number of columns that your printer has.

Next you may choose to have single sheet pause. If you don't, asterisks will divide each group of lines of the `LLIST`ing. After you have entered all of that information, the program will proceed to read the listing from the disk into the computer, byte by byte. When it is finished reading in one full page, you may start the `LLIST`ing of the program.

I have included a message that is shown on the screen while the data is being read from the disk. It tells you how much longer you must wait to begin printing the next page of the `LLIST`ing.

This program can be broken down into different sections that do different things. Lines 10-30 set up variables and display the title screen. If you have a printer with more than 80 columns, change `CO` in Line 11 to the number

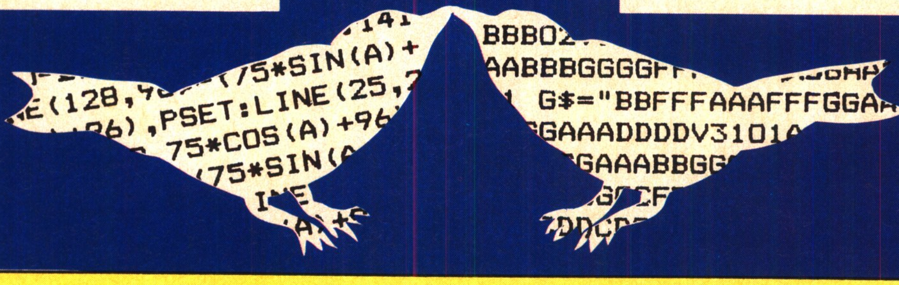
---

(Stephen Lai is a sophomore in high school living in Palatine, Ill. Programming on the CoCo is one of his favorite hobbies.)

of columns on your printer for a centered `LLIST`ing and the allowance of a longer title. You may change `NL` in Line 12 to however many lines you want printed on each page. Also, if you want a larger or smaller top margin, change `TM` in Line 13.

Lines 40-110 receive the input data from you concerning the `LLIST`ing. Line 120 instructs you to insert the disk containing the ASCII-saved program and press ENTER. Lines 130-280 read the program listing from the disk. Lines 300-410 print the listing. Lines 450-460 ask whether you wish to use the program again.

Two-Column Program LLISTer shouldn't be too hard for you to understand. It certainly can be improved, and provisions for specific printers can be added to it to increase its flexibility and value. Someone with a printer that allows for form feeding may wish to make a subroutine using it in this program.



120 186
END 91

The Listing: *2-COLUMN*

```
10 CLEAR4000
11 CO=80
12 NL=50
13 TM=5
20 DIMPL$(100):AL=0:CN=1:IN=INT(
(CO-70)/2):BL$=STRING$(32,32)
30 CLS:PRINT@32,"  TWO COLUMN PR
OGRAM LLISTER":PRINT@104,"BY STE
PHEN LAI"
40 PRINT@166,"INPUT THE PROGRAM'
S           DISK-SAVED (IN ASCII)
NAME:"
50 LINEINPUTDN$:IFLEFT$(RIGHT$(D
N$,4),1)<>"/"THENDN$=DN$+"/BAS"
60 IFLEN(DN$)>12ORLEN(DN$)<5THEN
30
70 PRINT@289,"INPUT THE PROGRAM'
S FULL NAME:"
80 LINEINPUTNM$:LE=LEN(NM$):IF L
E>CO THEN70
90 PN=INT((CO-LE)/2)
100 PRINT@385,"DO YOU WANT SINGL
E-SHEET PAUSE              (Y/N)
?"
110 I$=INKEY$:IFI$="Y"ORI$="y"TH
ENSP=1ELSEIFI$<>"N"ANDI$<>"n"THE
N110ELSESP=0
120 CLS:LINEINPUT"INSERT DISK AN
D PRESS <ENTER>";A$
130 OPEN"D",#1,DN$,1
140 FIELD#1,1 AS RD$
150 LF=LOF(1)
200 CLS:PRINT"  LLISTING WILL BE
GIN/CONTINUE  BEFORE THIS NUMBER
 REACHES"NL*2+1"."
210 FORF=1TONL*2:PL$(F)=BL$:NEXT
F
220 FORF1=1TONL*2:PL$(F1)=STRING
$(32,32)
230 FORF2=1TO32:CN=CN+1:IFCN>LF
THENST=1:GOTO300
240 GET#1,CN
250 IFRD$=CHR$(13)THEN280
260 MID$(PL$(F1),F2,1)=RD$
270 NEXTF2
280 PRINT@109,F1:NEXTF1
300 IFSP=1THENGOSUB400ELSEIFAL=0
THENGOSUB400ELSEPRINT#-2:PRINT#-
2,TAB(IN);STRING$(70,"*"):PRINT#
-2
310 CLS:PRINT"LLISTING...":FORF=
1TONL:PRINT#-2,TAB(IN);PL$(F);"
     ";PL$(F+NL)
320 NEXT
330 IFST=1THEN450
340 GOTO200
400 AL=1:CLS:PRINT"POSITION TOP
OF PAPER TO PRINTERHEAD AND PRES
S <ENTER>.";:LINEINPUTI$
410 PRINT#-2,STRING$(TM,13):PRIN
T#-2,TAB(PN);NM$:PRINT#-2:PRINT#
-2:RETURN
450 CLOSE:CLS:PRINT"THE TWO COLU
MN LLISTING IS DONE.PRESS 'Y' FO
R ANOTHER PROGRAM   LISTING OR '
N' TO STOP."
460 I$=INKEY$:IFI$="Y"ORI$="y"TH
ENRUNELSEIFI$="N"ORI$="n"THENEND
ELSE460
```

This program uses the four-block graphics characters of the Gemini-10X in compressed print to put the PMODE4 screen onto 8½ by 11-inch paper . . .

Get The Picture With Gemini Screen Print

By Richard Lack

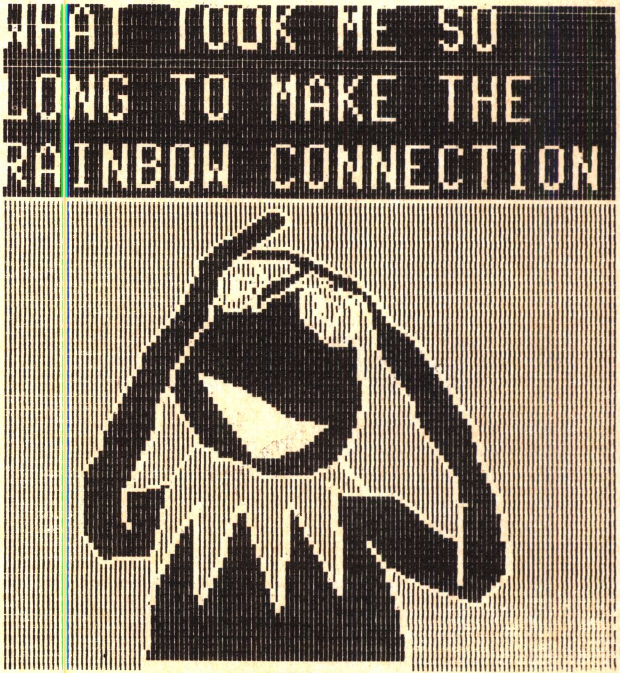
Most of *Gemini Screen Print* is concerned with translating four pixels (dots on the graphics screen — "PICture ELements") into a block graphics character the Gemini can understand. The subroutine at Line 1000 does this.

Since the block graphics characters have four cells, the computer must evaluate four pixels in order to make one block character for the printer. By assigning a number to each cell on the block characters, the computer can convert the four pixels into a block character.

Lines 1000-1030 total up the assigned numbers of the pixels to make a block for the printer. The upper left cell is assigned the number 2, the lower left is assigned 3, the upper right is 4, and the lower right is 8.

The computer evaluates the pixels on the screen, then adds the assigned number of the pixel if it is set to the block total (T). After all the pixels are totaled, the 'Z' array is used to convert the block total (T) into a usable block character for the printer in Line 1040. Finally, the character is sent to the printer in Line 40.

In order to use *Gemini Screen Print*, `CLOAD` it after getting the graphics screen into memory (draw the screen, load the screen, etc.), then `RUN` the program. It will print out the screen in a few minutes.



Sample Printout

The program is set up to print pictures that are black with a white background. You may change the program to print in inverse colors by changing lines 1000-1030 to read:

```
1000 T=0:P=PPOINT(X,Y):IF P=0 THEN T=T+2
1010 P=PPOINT(X,Y+1): IF P=0 THEN T=T+3
1020 P=PPOINT(X+1,Y): IF P=0 THEN T=T+4
1030 P=PPOINT(X+1,Y+1): IF P=0 THEN T=T+8
```

(Richard Lack is a sophomore in high school and has been using the Color Computer for several years. He and a friend, Steve Hemphill, run Ristar Systems.)

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All the control codes used in the program are in Line 15. The `CHR$(15)` puts the printer into compressed print mode, and the `CHR$(27);"A";CHR$(6)` sets the carriage returns to 6/72 of an inch, so the blocks of the printout will be close together.

Anyone having questions regarding this program may contact me at 7759 Hillrose St., Tujunga, CA 91042, phone (818) 352-7183.

The listing: *GEMPRINT*

```
1 ' Gemini Screen Print
2 '    By Richard Lack
10 PMODE4,1:SCREEN1,1
12 DIMZ(17):FORI=0TO17:READZ(I):
NEXTI:DATA0,0,1,2,3,9,7,6,4,11,5
,8,10,13,12,14,0,15
15 PRINT#-2,CHR$(15);CHR$(27);"A
";CHR$(6)
20 FORY=0TO192STEP2:FORX=0TO255S
TEP2
30 GOSUB1000
40 PRINT#-2,CHR$(C);:NEXTX:PRINT
#-2,"":NEXTY
999 GOTO999
1000 T=0:P=PPOINT(X,Y):IFP=0 THE
NT=T+2
1010 P=PPOINT(X,Y+1):IFP=0 THENT
=T+3
1020 P=PPOINT(X+1,Y):IFP=0THENT=
T+4
1030 P=PPOINT(X+1,Y+1):IFP=0 THE
NT=T+8
1040 C=224+Z(T):RETURN
```

One-Liner Contest Winner . . .

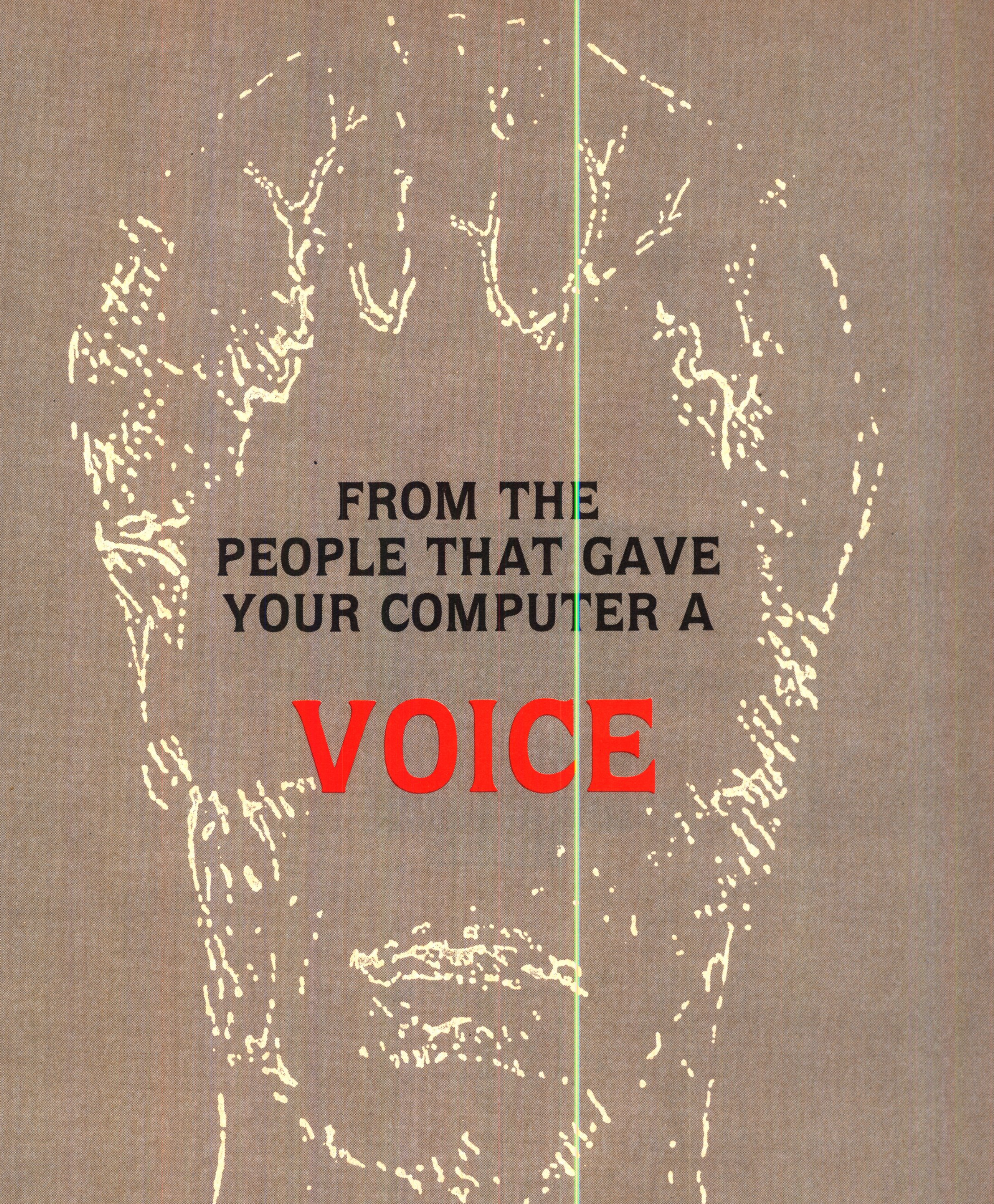
Spiral draws randomly generated spirals on the screen and then `PAINT`s around the outside (and sometimes inside) using `POKE 178,x` to create patterns. But this is more like wallpaper than paint!

The listing:

```
0 E=RND(0)*2:F=RND(0)*6:PMODE4,1
:SCREEN1,1:PCLS:A=0:L=0:X=0:Y=0:
DRAW"BM128,96":FORQ=1TO9999:L=L+
E:A=A+F:X=X+COS(A)*L:Y=Y+SIN(A)*
L:IFABS(X)>127ORABS(Y)>95THENPOK
E178,RND(255):PAINT(0,0),,1:FORQ
=1TO4000:NEXT:GOTOELSELINE-(128+
X,96+Y),PSET:NEXT:GOTO
```

D. Henderson
Huntsville, Ontario

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)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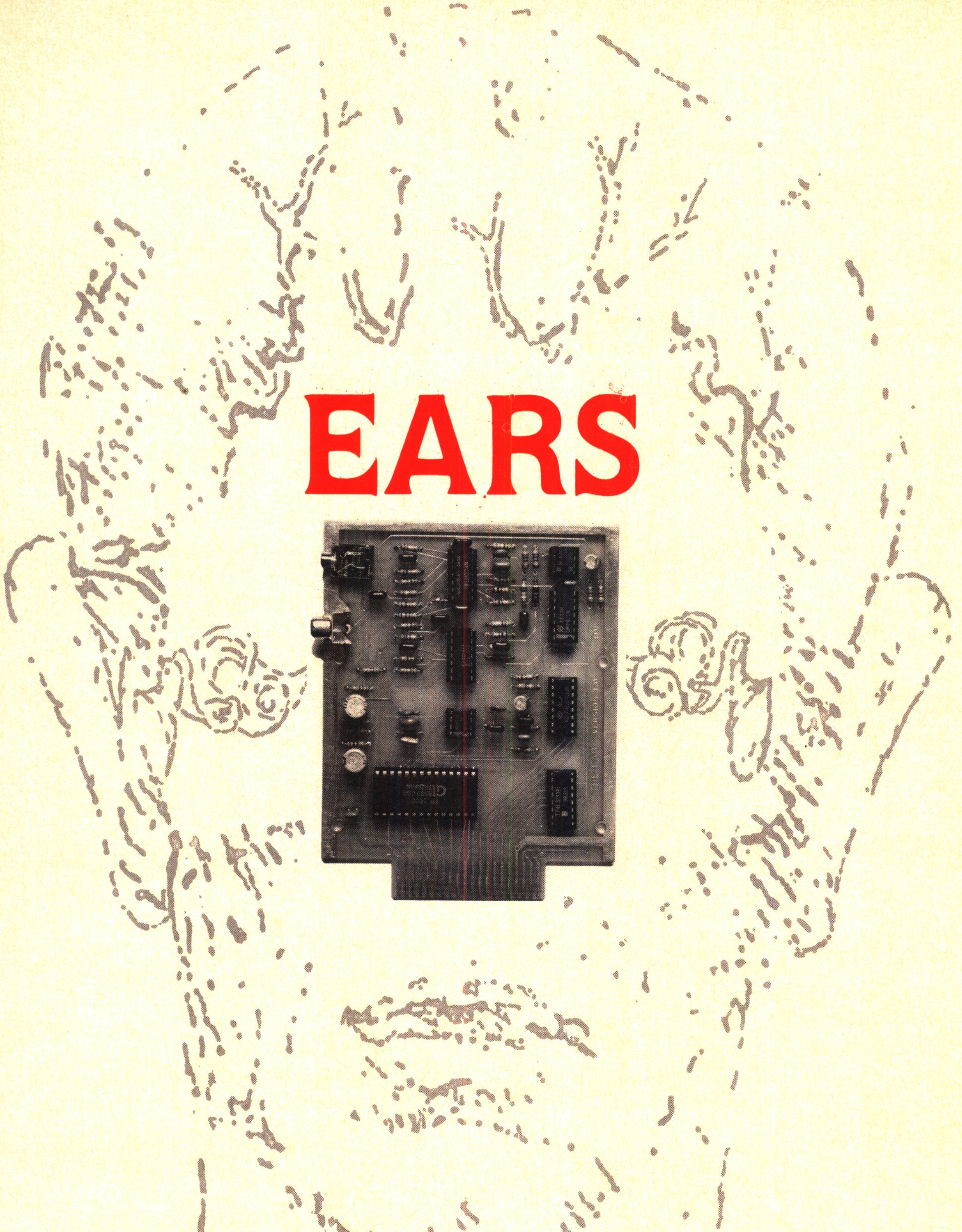

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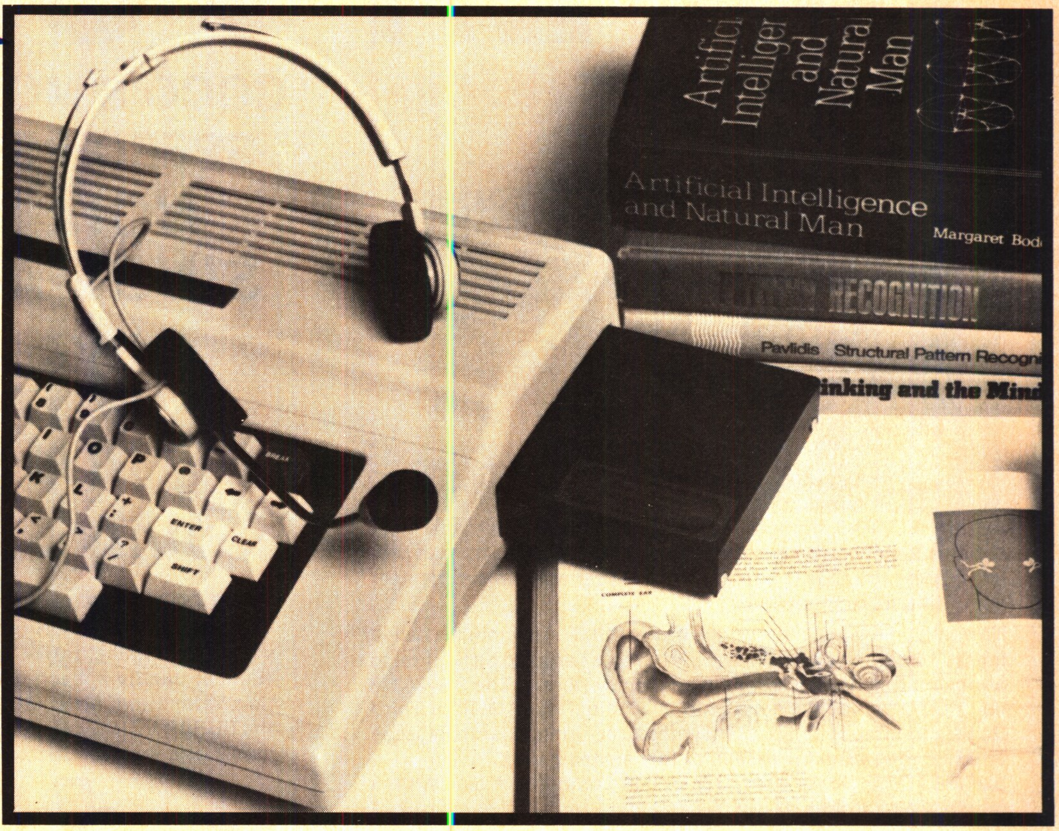
Artificial Intelligence and Natural Man
Margaret Bod
RECOGNITION
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COCO'S MOST ADVANCED SPEECH SYNTHESIZER.

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In 1979, VOTRAX brought us the SC-01 chip which made inexpensive speech synthesis possible. Speech Systems was proud to bring the COCO community the first speech synthesizer using this miracle device.

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FREE "REACTION" To Test Your Reflexes

FREE SUPER VOICE SINGS THE STAR SPANGLED BANNER

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	SUPER VOICE	REAL TALKER	RS SPEECH CARTRIDGE	VOICE-PAK
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4096 (32 absolute levels with 8 inflection speeds)	4	1	4

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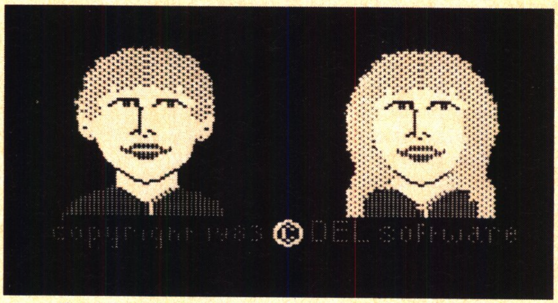

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When you buy
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We believe that no COCO speech synthesizer gives you the power and flexibility of the SUPER VOICE. Nevertheless, some have decided to go with the Radio Shack SPEECH & SOUND PAK. For those we've decided to open our TALKING LIBRARY by offering the SPEECH & SOUND TRANSLATOR . Just load this program and our entire library is open to you.

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Speech Systems is dedicated to bringing you the finest in music products. We are now proud to introduce MUSIC THEORY Courses 1 and 2. Each supports: drill and practice sessions, a scorecard to measure your progress, graphics and sound output for complete illustration of the concepts being introduced, and a reviewing session. Each course is a collection of programs emphasizing a particular subject area.

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This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2.

32K Disk only **$29.95**

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A more advanced course that deals with: Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and ear training of the intervals.

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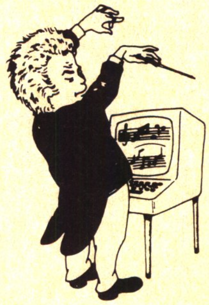
NEW!

MUSICA 2



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NEW LOW PRICE **$29.95**

Tape or Disk

Now shipping
Version 2.6
Previous users call
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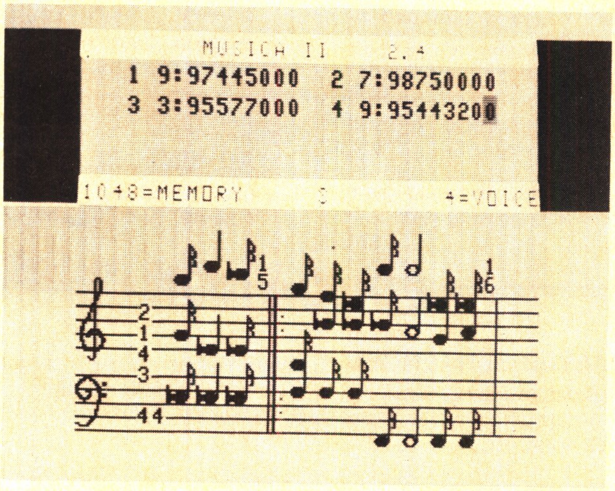
- When in stereo mode, music is played through our STEREO PAK (purchased separately).



```
MUSICA II      2.4
1 9:97445000  2 7:98750000
3 3:95577000  4 9:95443200
1048=MEMORY        0           4=VOICE
```

- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Durations include: whole, half, quarter, eighth, sixteenth, thirty second, sixty-fourth, and triplet.
- 30 page manual describes all.
- Requires minimum of 32K.

- Repeat bars allow repeating of music without re-inserting music a second or third time.

- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
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- Play music from your own BASIC program.
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- Vibrato effect easily produced.
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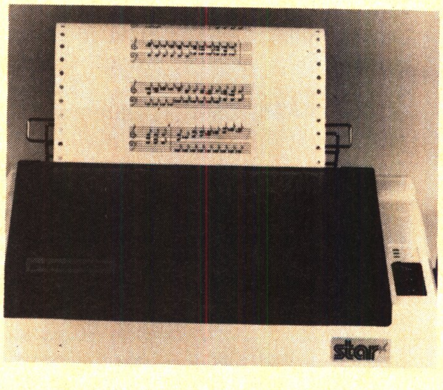

Output music to your printer (Gemini 10X, Epson, R.S. printers, Okidata).

NEW! STEREO PAK™ $39.95

Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY. Disk owners may use the STEREO PAK with the R.S. Multi-Pak or our Y-CABLE ($28.95)

New!
NOW "PLAY"
AND "SOUND"
COMMANDS COME
THRU THE
STEREO PAK
Requires 64K

NEW! MUSIC LIBRARY™ — 3 VOLUMES

10 HOURS OF MUSIC

BUY 2 GET 3rd FREE

You get over 100 four voice songs with a combined playing time of 3 hours. That's right, 3 hours of music. You won't belive your CoCo could sound so good. To fit over 100 songs required both sides of 5 C-20 tapes and the disk version uses 5 full disks (that's a half box of disks).

A JUKE BOX selection program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music.

These songs were developed using the best music program available for the CoCo; MUSICA 2. The tunes may be used as source files for MUSICA 2 and changed by the user. When coupled with the STEREO PAK the songs are reproduced in stereo with unsurpassed realism.

MUSIC LIBRARY 100 categories:

Stage, Screen, and TV	Classical
Music of the 70's	Christmas (popular)
Music of the 60's	Christmas (traditional)
Music of the 50's	Patriotic
Old Time Favorites	Polka Party

MUSIC LIBRARY 200
Our second volume of 100 tunes, 3½ hours of music.

MUSIC LIBRARY 300
Our third volume of 100 tunes, 3 more hours of music.

MUSIC LIBRARY (Each Volume) . .	(32K Tape) . . .	**$34.95**
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Two programs are provided free with each DATAPEN. SKETCH is a superb high resolution color drawing program allowing precise drawing and freehand sketching, painting and much more. SHAPE CREATE is a high resolution library shape drawing program. You can even save your work to tape or disk for later display or editing.

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APPLIANCES
WITH EARS

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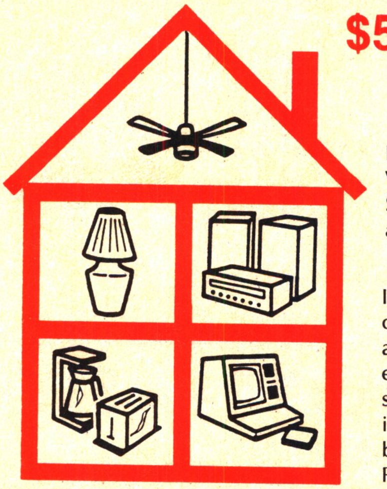
ON FRIDAY 7:42 PM, OFF SUNDAY 1:26 AM

Included FREE is a program to allow you to control up to 256 devices and specify the time and date they are to be activated. That's right, the software has its own built in accurate clock.



Imagine controlling a light or TV with your voice. When used with our Electronic Audio Recognition System, EARS, you can literally control any appliance.

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If you were disappointed in the software that came with the Radio Shack PLUG'N POWER unit, and you probably were, we'll offer you our powerful software separately. An early version is described in the Feb., April, June, and August 1983 issues of RAINBOW. Our current version is even better. **$19.95**

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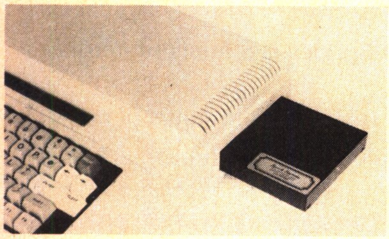

Now your computer will always know the correct time and date. This amazing precision time module is calibrated to the National Bureau of Standards (WWV) atomic clock and you should never have to change it.

Use the PRECISION TIME MODULE to add the time element to your games or use on BBS. If you like, purchase separately our BBS.

COLORAMA BBS (64 K, 1 drive minimum) **$99.95**

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Even when your computer is off, the clock keeps correct time by operating using the internal battery backup system.

THE TIMEPIECE FOR THE COLORAMA BBS

FREE TALKING CLOCK PROGRAM requires VOICE, SUPER VOICE, or SPEECH & SOUND PAK

MONTHS, LEAP YEARS & DST

The PRECISON TIME MODULE automatically adjusts for the different number of days in each month as well as leap years. And believe it or not, it adjusts for DST so you don't have to remember if it's SPRING FORWARD or FALL FORWARD.

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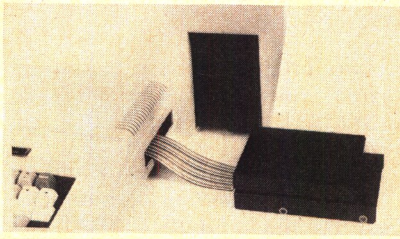
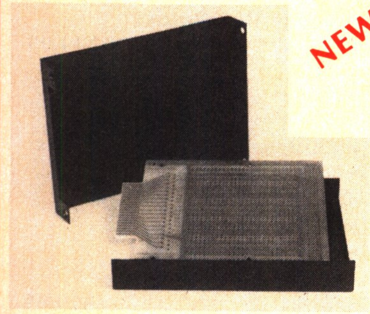
Why pay $100 to $200 for a multi-pak. With the Y-CABLE, you can connect your disk system to your computer along with either our STEREO PAK music synthesizer, our VOICE, SUPER VOICE speech synthesizers, or our PRECISION TIME MODULE. All connectors gold plated.

TRIPLE Y $34.95

We developed the Triple Y-Cable specifically for those interested in both speech synthesis and speech recognition. The Triple Y-Cable lets you connect EARS and SUPER VOICE to your color computer along with your disk system.





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Advanced Speech Chip
SSI-263
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How To Hook Up The Radio Shack Voice Synthesizer

By Tony DiStefano
Rainbow Contributing Editor

A little while back, I did a project using the Votrax SC-02 voice synthesizer chip to make CoCo talk. It was an interesting project and I got a lot of correspondence about it. However, not all of it was good. People found that the chip was hard to find, and when they found it, it was very expensive. Ever since that time, I have been getting letters inquiring about how to hook up Radio Shack's own speech synthesizer to the CoCo.

I just came back from the Irvine RAINBOWfest in California, and believe it or not, more than one person asked me about this synthesizer. I know I am slow at times, but I think I finally got the message. So, this month we are presenting "How to Hook up the Radio Shack Voice Synthesizer to Your Color Computer."

But, first things first! I got a good piece of information while I was at the Irvine RAINBOWfest. I was talking to a gentleman about the "ins and outs" of the CoCo and we came upon the subject of repairing. If you have the 'F' board (also known as the 285 board) this is for you.

On some of these boards, there is a problem (an intermittent one at that). The symptoms are as follows: the computer works fine for a while, then all of a sudden random characters start to appear in columns one and nine of the screen. Just about this time, the computer freezes up and all work that is there gets lost. According to the gentleman I spoke with, the problem stems from the SAM; it is some sort of heat problem.

He says that Radio Shack is aware of this and is offering some help. Go to your Radio Shack dealer and order the "Final Fix" for the old CoCo.

Let's get back to the synthesizer. When I went to buy the chip, I saw there were two different sets: the older 276-1783 chip set and the newer 276-1784. Only the 1784 is listed in the new catalog, so I decided to go with it. This is just one chip while the 1783 is two. The package of this chip says that it comes 1) complete with specifications, applications data and programming information, and 2) requires additional components and skill in project assembly.

That's fine, but they don't tell you how to hook it up to your Color Computer.

Usually, in this next section I describe the functions of my project. This time, the project I am doing comes with a 20-page manual. I must say it is not a bad manual; the only thing left out was the circuit to connect it to the CoCo. But once the circuit is up and running, all you need to start writing programs that talk is in the book. It has all of the "allophone" set (as they call it) and even has a dictionary of words. It also includes a set of rules for using these allophones.

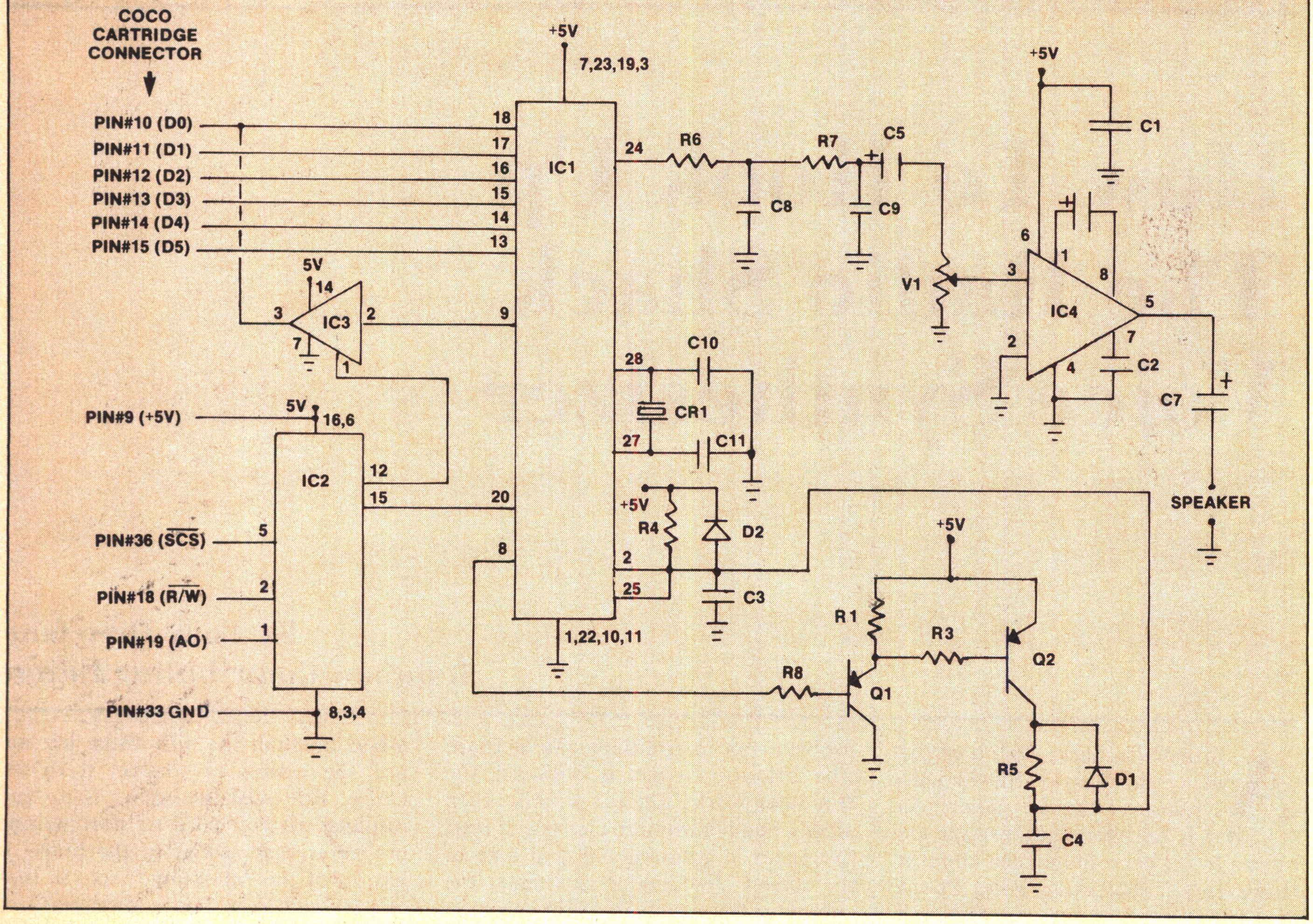
From the diagram and the description of this chip, I think you can add more chips to it so it can speak more sounds, possibly whole sentences and phrases. There is, however, no reference to part numbers or where and when these chips will be available. There will probably be more on this later. Anyway, I included a BASIC program listing you can use to try out your project.

This chip, as is, is quite easy to implement to the CoCo. It is basically divided into two parts. The first part is to get the data to the chip. The second is to poll the chip until it is not busy. Then you can give it the next piece of data.

It is just like a parallel printer; in fact, if the CoCo had a parallel printer port, I would have used it without any other extra parts. But that is not the case, so I used the old cartridge method which means it is connected to the CoCo via the cartridge connector, so if you have a disk drive, you will need a multipack or some kind of a switch.

(Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.)

Figure 1



It will not work with just a Y-cable because I used the *SCS output of the computer and it is used by the disk controller (see my previous article on the Multi-Pak Interface). With a few more chips, you *can* make it work with just a Y-cable. I will be doing an article soon on the technique of memory mapping and how to memory map something anywhere in memory.

To get data to the chip is easy. All you have to do is strobe the *ALD pin with data valid on the data lines and the data is entered. You can use the *SCS pin and you would not need any other parts, but there is another location to monitor. That is the pin that says when the chip is no longer busy with the last command you gave it, which is the *LRQ pin.

This is where the two TTL chips I added come in. The first chip is a 74LS138; this is a decoder chip. It is capable of decoding a three-bit binary number into its eight different outputs. It also has three other select lines. Examine the 74LS138 in Figure 1 and notice that all I used is three lines. That is all that's necessary for this project.

We need two locations, one to write the data to the chip, and the other to read the busy pin of the chip. The *SCS pin of the CoCo selects the 74LS138 chip. A0 selects which location and the *R/W lines select a read or a write. Since we are using the *SCS pin on the CoCo, location $FF40 (65344 in decimal) is the base address. We are using only A0 so the two locations are $FF40 and $FF41.

In this case, $FF40 (65344) is the write location which is used to transfer data to the chip. Location number $FF41 (65345 in decimal) is used to monitor if the chip is busy. Reading (or PEEKing in BASIC) this location reveals whether it is busy or not.

The *LRQ line is connected to the input of a tri-state buffer. This is the 74LS125 chip. Only one of the four gates is connected. The output of this gate is connected to D0 on the CoCo bus. When you read the location, all other bits in the byte are irrelevant. If bit 0 is a logic 1, the buffer is full and the chip is busy. When this bit is logical 0, the chip is free and waiting for another command.

The rest of the circuit is the same as the recommended circuit by Radio Shack. There is one thing that confuses me about the Radio Shack circuit and I don't have the solution. It is the reset circuit: the two transistors, diodes, capacitor and resistors that connect to the reset and SBT reset. This circuit, as is, does nothing. I think it has something to do with the little arrow and the "NOTE" sign. What does that note refer to? Where is that note? What does that do?

I constructed the whole circuit, along with my circuit, and it worked fine. I monitored the SBY pin on the synthesizer chip and found it did nothing. It was always a logical 1. I disconnected the pin from the rest of the circuit; it still made no difference, so I cut out all the components except for the 100K resistor.

If you feel you must leave this circuit in, fine. Better yet, if you have an answer as to why it is there, please write me; I would like to know.

If you have a Multi-Pak from Radio Shack, a simple poke will give you access to the chip by changing the soft switch inside the Multi-Pak Interface. Remember that the Multi-Pak can change access to the *CTS pin and the *SCS pin. The *CTS pin controls 16K of software and the *SCS controls 32 bytes of I/O. The control byte is $FF7F (65407 in decimal).

To change the selector, you must poke a number into this byte. The most common configuration is to have the controller in slot #4 and the voice in slot #1. In that case, the value you must poke in the control location is a value of $30 (48 in decimal). Refer to your MPI manual for more details.

Table 1 lists all the parts necessary to build this voice synthesizer, including the parts in that reset circuit. At the end of this article, there is a list of mail-order stores that you can get parts from. There is no guarantee that any or all of these stores will have these parts. Except for the TTL chips and the proto-board, Radio Shack will have all of these parts.

There is one more thing to note. The diagram requires a 3.12 MHz crystal. The manual says you can order this crystal from Radio Shack, but you will have to wait. I didn't want to wait, so I bought Radio Shack's 3.579545 MHz crystal instead, which they had in stock. It works just as well, except the voice will be about 14 percent faster.

As usual, if you have problems with this or any of my projects, write to me (through RAINBOW) and I'll try to help you. If you have an emergency, you can call me on *Monday night only* after supper. My number is (514) 473-4910.

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(415) 592-8097

Dokay Computer Products, Inc.
2100 De La Cruz Blvd.
Santa Clara, CA 95050
(800) 538-8800

Table 1

Number	Description
IC1	SPO256-AL2 (Radio Shack #276-1784)
IC2	74LS138
IC3	74LS125
IC4	LM386
C1,2,3,4	.1uf 15V
C5	1uf 15V
C6	10uf 15V
C7	100uf 15V
C8,9	.022uf 15V
C10,11	22pf 15V
R1	1K ¼W
R2	10K ¼W
R3	200K ¼W
R4,5	100K ¼W
R6,7	33K ¼W
R8	10 ¼W
V1	10K POT
CR1	3.12 MHz (see text)
D1,2	1N914
Q1,2	MPS 2907 or 2N2907
Misc.	Proto-board, speaker, solder, wire, case

The listing: *TURNSCRW*

```
1 ' THIS IS FOR THE RADIO SHACK
2 ' VOICE SYNTHESIZER IC
3 ' FROM RAINBOW'S
4 ' TURN OF THE SCREW
5 ' BY TONY DISTEFANO
6 '
10 FOR I= 1 TO 55
20 READ A
30 POKE&HFF40,A
40 IF (PEEK(&HFF41) AND 1) = 1 T
HEN 40
50 NEXT I
60 END
100 DATA 27,7,45,15,53,4
110 DATA 24,06,04
120 DATA 26,26,16,4
130 DATA 20,04
140 DATA 13,23,23,2,42,12,44,4
150 DATA 42,15,16,9,49,22,13,51,
4
160 DATA 4
170 DATA 63,24,06,4
180 DATA 13,53,11,19,4
190 DATA 33,12,55,0,13,7,0,40,26
,26,56,53,1
```

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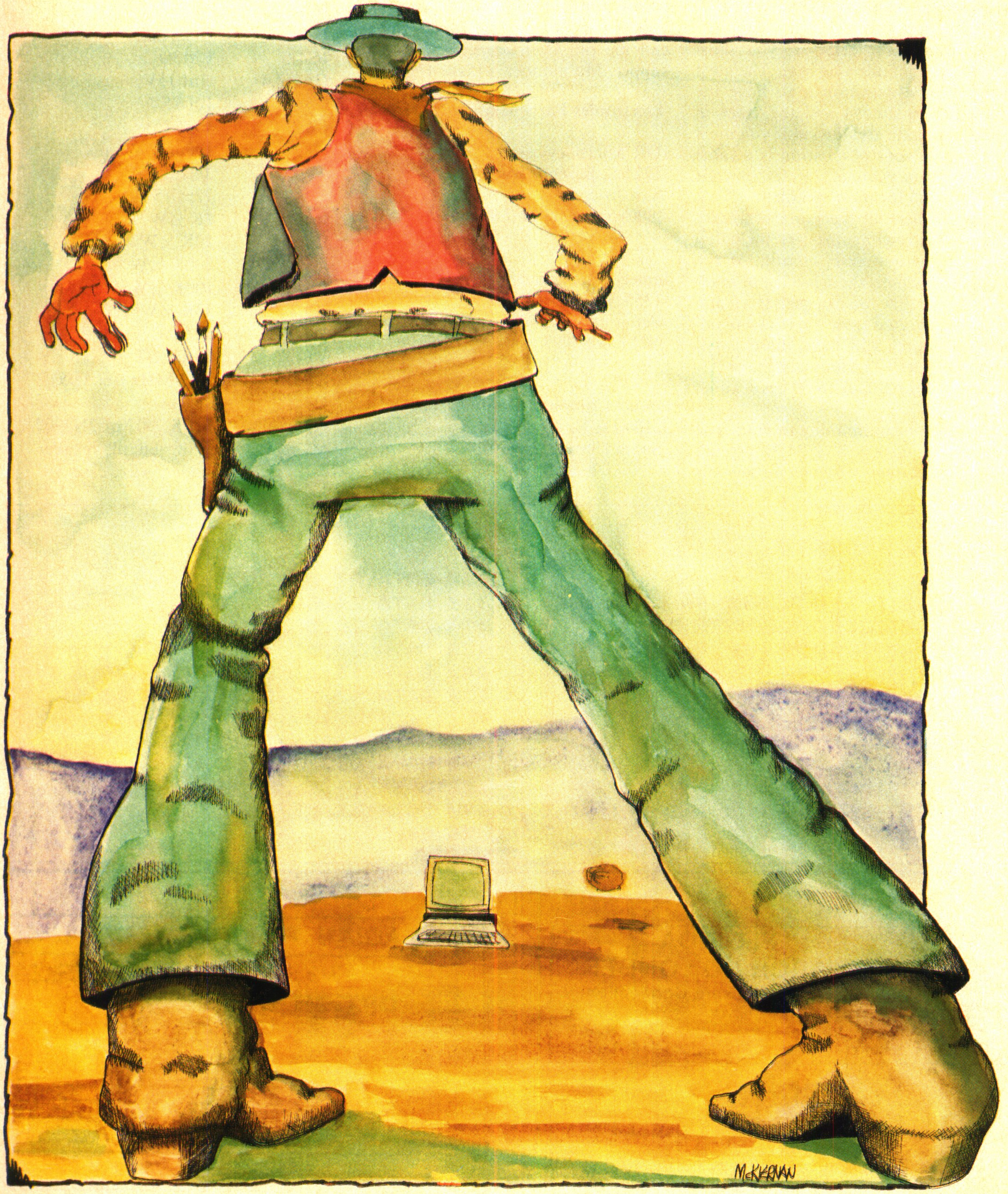

16K
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Quick Draw CoCo

By H. Allen Curtis

Would you like to be able to write BASIC programs in which the graphics screens are generated almost instantaneously? If so, you should be interested in the program *KwikDraw*.

KwikDraw cannot be employed in the original creation of a picture. Instead, it requires an input of one or more graphics screens recorded on cassette tape.

KwikDraw provides an especially convenient way to incorporate into your BASIC programs the pictures created by utility programs such as Radio Shack's *Micropainter*. Aids of this type permit you to save your graphics creations on tape. These recordings can be used as inputs to *KwikDraw*. Lacking such aids, you will have to save pictures created by conventional means — the use of combinations of `DRAW`, `LINE`, `CIRCLE` and `PAINT` commands.

KwikDraw loads the saved graphics screens, encodes them to reduce memory requirements and stores them in a memory space within the confines of a preliminary version of a BASIC program. Then in your program you can put any of the stored pictures on display practically instantaneously by merely issuing the command `Q=USR(N)`. If you have 'K' pictures to display, 'N' is an integer from one through 'K.'

Although *KwikDraw* is a BASIC program, it generates and makes use of six machine language routines. The first of these routines, called *Count*, counts the number of bytes needed to encode the most recently loaded graphics screen. Given the byte count, the second routine, *Free*, frees a space in your program for the encoded screen to reside. *Code*, the third routine, does the actual encoding and storing of the screen.

Occasionally, the encoding of a graphics screen will not provide any reduction in memory. In that case, the fourth routine, *Store*, stores the unencoded screen in your BASIC program. The fifth routine, *Display*, becomes a part of

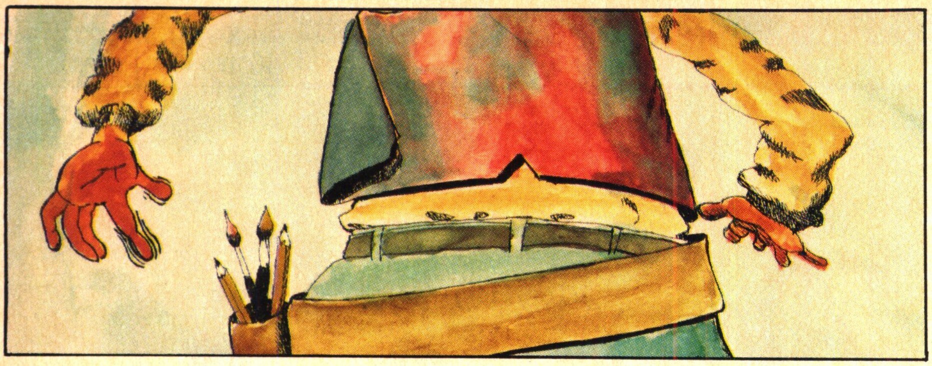


Table 1: COUNT Routine

Address	Hex Code	Mnemonic	Operand	Comment
3F36	DE BA	LDU	BA	;U is beginning screen address
3F38	30 C9 18 00	LEAX	1800,U	;X is successor of final screen address
3F3C	9F 44	STX	44	;Save it
3F3E	9E 8A	LDX	8A	;Zero X
3F40	A6 C0	LDA	,U+	;Get character
3F42	5F	CLRB		;Zero B
3F43	5C	INCB		;Bump B
3F44	27 05	BEQ	3F4B	;Branch if 256 consecutive addresses contained same character
3F46	A1 C0	CMPA	,U+	;Are characters the same?
3F48	27 F9	BEQ	3F43	;Loop if they are
3F4A	8C 33 41	CMPX	#3341	;Ignore or bump U
3F4D	30 02	LEAX	2,X	;Double bump X
3F4F	11 93 44	CMPU	44	;Have all characters been gotten?
3F52	2E 04	BGT	3F58	;If so, branch
3F54	33 5F	LEAU	-1,U	;Decrement U
3F56	20 E8	BRA	3F40	;Loop
3F58	1F 10	TFR	X,D	;D contains count
3F5A	7E B4 F4	JMP	B4F4	;Pass count to BASIC and exit

Table 2: FREE Routine

Address	Hex Code	Mnemonic	Operand	Comment
3F5D	BD B3 ED	JSR	B3ED	;D has new end of BASIC program address
3F60	8E 00 00	LDX	#0000	;X is count POKEd from BASIC
3F63	DD 1B	STD	1B	;Set end of BASIC program pointer
3F65	1F 03	TFR	D,U	;U has new end of BASIC program address
3F67	AF 5B	STX	-5,U	;Store count
3F69	6F 5D	CLR	-3,U	;Clear last
3F6B	6F 5E	CLR	-2,U	3 bytes
3F6D	6F 5F	CLR	-1,U	of BASIC program
3F6F	39	RTS		;Exit

your program; its function is to put, upon demand, each of the stored screens on display. The sixth routine, *Xfer*, transfers *Display* from *KwikDraw* to your BASIC program in a space adjacent to the final stored screen.

KwikDraw is shown in Listing 1. The DATA statements of lines 70 through 110 correspond to the routine *Count*. Similarly, the DATA statements associated with lines 120 through 140, 150 through 200, 210 through 230, 240 through 320, and 330 through 340 are employed in the generation of the routines *Free*, *Code*, *Store*, *Display* and *Xfer*, respectively.

Lines 10 through 50 generate the six routines and store them in the high RAM area of your CoCo, whether you have a 16K or 32K byte RAM. These routines are stored in the same area that RAINBOW Check Plus occupies. Therefore, if you are using the latter program as an aid in the correct typing of Listing 1, you must not run *KwikDraw* until your typing is complete and correct.

If you bypass the use of RAINBOW Check Plus, Line 60 of Listing 1 will provide an accuracy check on your typing of *KwikDraw*'s 28 DATA statements. Otherwise, Line 60 will offer a double-check on your typing.

The remaining lines of Listing 1 are concerned with the actual process of loading, encoding and storing graphics screens in the preliminary version of your BASIC program. These lines also provide prompts to facilitate your interaction in the process.

When you complete the correct typing of *KwikDraw*, save it on tape or diskette, then run *KwikDraw*. If your typing was accurate, you should, after a pause of a few seconds, receive a "position tape for loading" prompt.

Presumably, you will not presently have any graphics screens ready to load, so press the BREAK key to terminate the program.

KwikDraw as represented by Listing 1 is designed to handle PMODE3 and/or PMODE4 graphics screens. A version of *KwikDraw* which treats PMODE1 and/or PMODE2 screens can be obtained by changing Listing 1 as follows: In Line 60, replace the checksum 22019 with

(H. Allen Curtis lives in Williamsburg, Va. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.)

21995; in lines 70, 240 and 280 replace the value 18 with the value 'C'; in Line 220, replace the value E8 with F4; in Line 380, replace 6143 and 6144 with 3071 and 3072, respectively.

After making the changes, run the new version of *KwikDraw* to make certain it reaches the first prompt without an error message. Then save it on tape or diskette.

To illustrate how the higher resolution version of *KwikDraw* works, two graphics screens will be created and saved by means of the program of Listing 2. Those screens will serve as inputs to *KwikDraw*.

The two screens created by the program of Listing 2 are adaptations of screens used in Fred Scerbo's striking 3-D arcade game, *Startrench Warfare 1.0*, which appeared in the November 1982 issue of THE RAINBOW.

After correctly typing the program of Listing 2, save it on tape and run it. You should see the creation of the first screen picture followed quickly by a "position a tape to save graphics screen" prompt. In response to the prompt, move the tape forward to a convenient point and note the counter setting. Then, as the prompt says, press ENTER.

Respond to the next prompt to save the first screen. Because the saved screen resides in a 6K byte memory area, you will have a relatively long wait for the completion of the recording of the screen. The completion will trigger the creation of the second graphics screen. At that time, release the Record and Play buttons of the recorder. When the prompts appear, answer them in the same way you did previously.

If you have a disk-based system, each screen, before it is saved, will reside in the memory area at hexadecimal addresses E00 through 25FF. However, if you have a cassette-based system or if your disk controller is disconnected, the screen memory area will be at addresses 600 through 1DFF.

Line 190 of Listing 2 first determines whether or not a disk controller is connected, then it saves the screen from the associated memory area. When you save other graphics screens in the future, you will, depending on your system, have to employ `CSAVEM`s of one of the two forms shown in Line 190.

When you have good recordings of the two graphics screens, you will be ready to try *KwikDraw*. So that no remnants of the screens are left in the computer, turn your CoCo off and then on again. Load the first version of *KwikDraw* and run it.

Use the previously noted recorder counter setting to position the tape to load the first graphics screen. Then, in accordance with the prompts, press ENTER; next depress the Play button and press ENTER again. The current prompt will remain on display until loading is finished.

When loading is done, a new prompt will appear and inform you how many bytes are required to encode and store the screen. In this example you will want to store both graphics screens; hence, press the 'Y' key in response to

Table 3: CODE Routine

```
Address Hex Code     Mnemonic  Operand  Comment

3F70    DE BA        LDU       BA       ;U is beginning screen
                                         address
3F72    9E 1B        LDX       1B       ;X is end of BASIC program
                                         pointer
3F74    30 1B        LEAX      -5,X     ;X points to stored count
3F76    9F 44        STX       44       ;Save it
3F78    1F 10        TFR       X,D      ;D points to stored count
3F7A    AE 84        LDX       ,X       ;X has count
3F7C    9F 42        STX       42       ;Save it
3F7E    93 42        SUBD      42       ;D is first address of
                                         encoding
3F80    1F 01        TFR       D,X      ;X is first address
3F82    A6 C0        LDA       ,U+      ;Get character
3F84    A7 80        STA       ,X+      ;Store it in BASIC program
3F86    5F           CLRB               ;Zero B
3F87    5C           INCB               ;Bump it
3F88    27 05        BEQ       3F8F     ;Branch if 256 consecutive
                                         characters are the same
3F8A    A1 C0        CMPA      ,U+      ;Are characters the same?
3F8C    27 F9        BEQ       3F87     ;Loop if the same
3F8E    8C 33 41     CMPX      #3341    ;Ignore or bump U
3F91    E7 80        STB       ,X+      ;Store character no.
3F93    9C 44        CMPX      44       ;All characters gotten?
3F95    27 D8        BEQ       3F6F     ;If so, exit
3F97    33 5F        LEAU      -1,U     ;Decrement U
3F99    20 E7        BRA       3F82     ;Loop
```

Table 4: STORE Routine

```
Address Hex Code     Mnemonic  Operand  Comment

3F9B    DE BA        LDU       BA       ;U is beginning screen
                                         address
3F9D    9E 1B        LDX       1B       ;X is end of BASIC program
                                         pointer
3F9F    30 1B        LEAX      -5,X     ;X points to count
3FA1    9F 44        STX       44       ;Save it
3FA3    30 89 E8 00  LEAX      -1800,X  ;X is first address to store
                                         screen characters
3FA7    A6 C0        LDA       ,U+      ;Get character
3FA9    A7 80        STA       ,X+      ;Store it
3FAB    9C 44        CMPX      44       ;Characters stored?
3FAD    26 F8        BNE       3FA7     ;If not, loop
3FAF    39           RTS                ;Exit
```

Table 5: DISPLAY Routine

Address	Hex Code	Mnemonic	Operand	Comment
3FB0	BD B3 ED	JSR	B3 ED	;D is screen number
3FB3	DE BA	LDU	BA	;U is first address of screen
3FB5	30 C9 18 00	LEAX	1800,U	;X is 1 greater than final screen address
3FB9	9F 44	STX	44	;Save it
3FBB	D7 42	STB	42	;Save screen number
3FBD	30 8C EE	LEAX	-12,PC	;X points to number of bytes
3FC0	1F 10	TFR	X,D	;D points there too
3FC2	A3 84	SUBD	,X	;D is possible beginning of encoded screen
3FC4	1F 12	TFR	X,Y	;Y points to number of bytes
3FC6	1F 01	TFR	D,X	;X is possible beginning of screen
3FC8	0A 42	DEC	42	;Decrement screen number
3FCA	27 04	BEQ	3FD0	;Branch when encoded screen is found
3FCC	30 1B	LEAX	-5,X	;X is new address of number of bytes
3FCE	20 F0	BRA	3FC0	;Loop
3FD0	EC A4	LDD	,Y	;D is number of bytes
3FD2	10 83 18 00	CMPD	#1800	;6K?
3FD6	27 0F	BEQ	3FE7	;Branch if 6K
3FD8	A6 80	LDA	,X+	;Get character
3FDA	E6 80	LDB	,X+	;Get character
3FDC	A7 C0	STA	,U+	;Store character in screen memory
3FDE	5A	DECB		;Reduce count
3FDF	26 FB	BNE	3FDC	;Loop if count is
3FE1	11 93 44	CMPU	44	;All characters to screen
3FE4	2D F2	BLT	3FD8	;If not, loop
3FE6	39	RTS		;Exit
3FE7	10 AE 81	LDY	,X++	;Get two characters
3FEA	10 AF C1	STYX	,U++	;Store them in screen memory
3FED	11 93 44	CMPU	44	;All 6K characters
3FF0	26 F5	BNE	3FE7	;If not, loop
3FF2	39	RTS		;Exit

Table 6: XFER Routine

Address	Hex Code	Mnemonic	Operand	Comment
3FF3	30 8C BA	LEAX	-46,PC	;X is first address of present DISPLAY
3FF6	DE 1B	LDU	1B	;U points to end of BASIC program
3FF8	33 C8 BA	LEAU	-46,U	;U points to DISPLAY destination
3FFB	C6 43	LDB	#43	;B is number of bytes in DISPLAY
3FFD	7E A5 9A	JMP	A59A	;Move DISPLAY and exit

the prompt. Also press 'Y' for the following prompt to permit the loading of the second screen. Appropriately respond to the next prompts to load the screen.

After the second screen has loaded, answer the ensuing prompt by typing 'Y' to initiate the storing of the encoded screen. Since there are no more screens on tape, type 'N' when asked whether you have another picture to load.

Just before *KwikDraw* comes to an end, it deletes all its lines but one — Line 5. That line is always the initial line of your BASIC program that will "instantaneously" display its stored graphics screens.

The program of Listing 3 will display both stored screens in such a way as to give the impression that a space station with a moving trench is orbiting through a star-studded firmament. This program serves as an instructive illustration of a BASIC program employing *KwikDraw*'s encoded and stored graphics screens.

Carefully type the program of Listing 3 and save it on tape or diskette, then turn your CoCo off and on again. Load the program of Listing 3 and run it to see a three-dimensional display of space flight.

It should be noted that no speed-up POKE was necessary to obtain fast graphics. On the contrary, the generation of each graphics screen was so rapid that delays were used to make the trench movement more realistic.

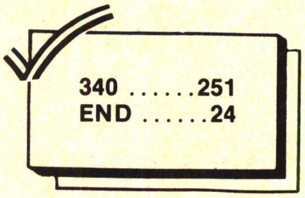
As strange as it may seem, Q=USR(2) and Q=USR(1) of this program are employed in the displaying of the first and second screens, respectively, stored by *KwikDraw*. In general, the first graphics screen stored by *KwikDraw* will have the highest USR function argument; whereas the last screen stored will have one for its associated USR function argument.

Tables 1-6 are disassemblies of the six machine language routines used in *KwikDraw*. They are presented for those interested in discovering the details of how *KwikDraw* works. The tables should also facilitate program modifications such as those permitting *KwikDraw* to handle partial screens as well as full graphics screens.

In the tables, the symbol '$' which designates hexadecimal, has been omitted with the understanding that all addresses are in hexadecimal. All addresses appearing in the tables are associated with CoCos having 16K byte RAMs. For a 32K RAM CoCo, those addresses are understood to be 4000 hexadecimal greater.

The dual machine language instruction 8C 33 41 has been used twice in the routines. This instruction, when reached from its predecessor instruction, functions as a CMPX #3341 instruction that effectively does nothing. However, when a branch is made to its second byte, it acts as a LEAU 1,U instruction.

The screen encoding scheme associated with the *Count*, *Code* and *Display* routines is as follows: If the number of bytes in the encoding is 'n,' then there are n/2 pairs of bytes such that the first byte of each pair is a graphics character and the second is the number of times that character appears in succession.



340 251
END 24

Listing 1: *KWIKDRAW*

```
5 X=256*PEEK(27)+PEEK(28)-70:DEF
USR=X
10 X=256*PEEK(116)+54:CLEAR200,X
-1
20 X=256*PEEK(116)+54:DEFUSR=X
30 DEFUSR1=X+39:DEFUSR2=X+58:DEF
USR3=X+101:DEFUSR4=X+189
40 FORI=0TO201:READA$
50 A=VAL("&H"+A$):B=B+A:POKEI+X,
A:NEXT
60 IFB<>22019THENCLS:PRINT"DATA
ERROR":STOP
70 DATA DE,BA,30,C9,18,0,9F,44
80 DATA 9E,8A,A6,C0,5F,5C,27,5
90 DATA A1,C0,27,F9,8C,33,41,30
100 DATA 2,11,93,44,2E,4,33,5F
110 DATA 20,E8,1F,10,7E,B4,F4
120 DATA BD,B3,ED,8E,0,0,DD,1B
130 DATA 1F,3,AF,5B,6F,5D,6F,5E
140 DATA 6F,5F,39
150 DATA DE,BA,9E,1B,30,1B,9F,44
160 DATA 1F,10,AE,84,9F,42,93,42
170 DATA 1F,1,A6,C0,A7,80,5F,5C
180 DATA 27,5,A1,C0,27,F9,8C,33
190 DATA 41,E7,80,9C,44,27,D8,33
200 DATA 5F,20,E7
210 DATA DE,BA,9E,1B,30,1B,9F,44
220 DATA 30,89,E8,0,A6,C0,A7,80
230 DATA 9C,44,26,F8,39
240 DATA BD,B3,ED,DE,BA,30,C9,18
250 DATA 0,9F,44,D7,42,30,8C,EE
260 DATA 1F,10,A3,84,1F,12,1F,1
270 DATA A,42,27,4,30,1B,20,F0
280 DATA EC,A4,10,83,18,0,27,F
290 DATA A6,80,E6,80,A7,C0,5A,26
```

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```
300 DATA FB,11,93,44,2D,F2,39,10
310 DATA AE,81,10,AF,C1,11,93,44
320 DATA 26,F5,39
330 DATA 30,8C,BA,DE,1B,33,C8,BA
340 DATA C6,43,7E,A5,9A
350 CLS:PRINT@259,"POSITION TAPE
 FOR LOADING":PRINT@291,"THEN PR
ESS ENTER":MOTORON
360 GOSUB600:MOTOROFF:PRINT@259,
"DEPRESS PLAY BUTTON"
370 GOSUB600:CLOADM
380 N=USR(0):IFN>6143THENN=6144
390 K=MEM-N:CLS:PRINT@225,"YOUR
PICTURE USES";N;"BYTES.":PRINT@2
57,"STORING IT WILL LEAVE";K;"
   BYTES OF MEMORY.":PRINT@353,"
DO YOU WANT TO STORE IT? (Y/N)"
400 K$=INKEY$:IFK$=""THEN400ELSE
IFK$<>"Y"THEN440
410 GOSUB700
420 CLEAR200
430 Y=256*PEEK(116)+97:IFPEEK(Y)
=24THENA=USR3(0)ELSEA=USR2(0)
440 CLS:PRINT@257,"DO YOU HAVE A
NOTHER PICTURE TO  LOAD? (Y/N)"
450 K$=INKEY$:IFK$=""THEN450ELSE
IFK$="Y"THEN350
460 N=62:GOSUB700:CLEAR200
470 A=USR4(0)
500 DEL10-
600 K$=INKEY$:IFK$<>CHR$(13)THEN
600ELSERETURN
700 B=INT(N/256):C=N-256*B:Y=256
*PEEK(116)+97:POKEY,B:POKEY+1,C:
D=C+PEEK(28):B=B+PEEK(27):IFD>25
5THEND=D-256:B=B+1
710 PRINTUSR1(256*B+D+5):CLS:RET
URN
```

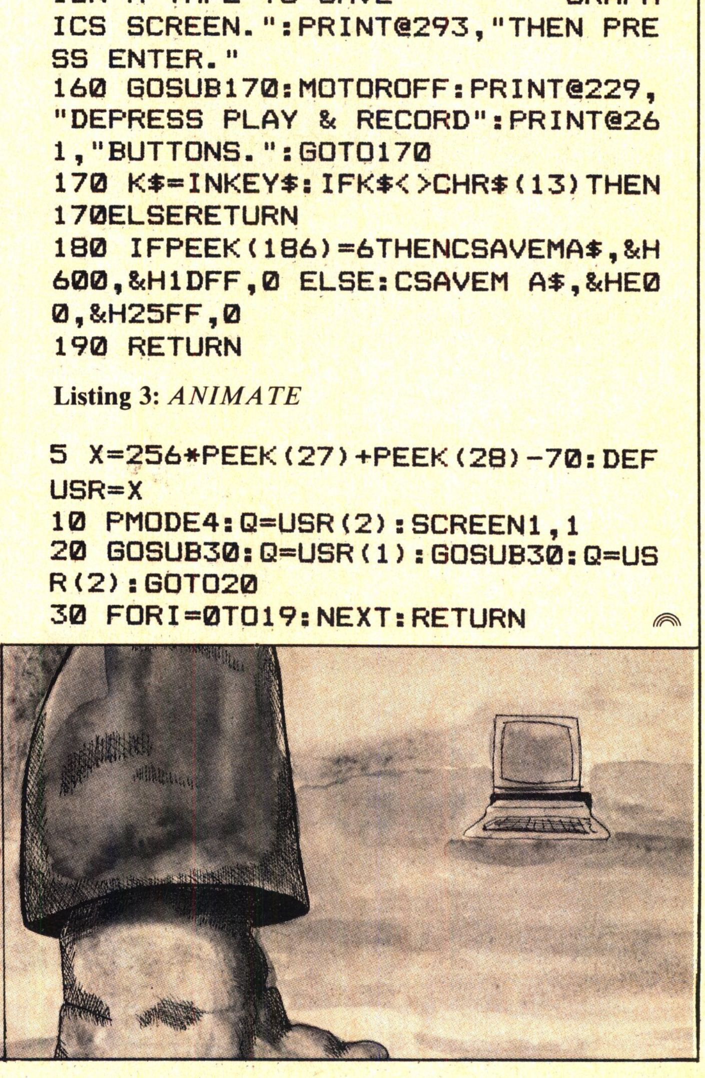
90 141
END 35

Listing 2: *PIXGEN*

```
10 A$="GRAF1":PMODE4:PCLS:SCREEN
1,1:GOSUB110
20 LINE(0,123)-(86,123),PRESET:L
INE-(87,146),PRESET,BF:LINE-(166
,146),PRESET:LINE-(167,123),PRES
ET,BF:LINE-(256,123),PRESET
30 PMODE4:LINE(0,132)-(56,132),P
RESET:LINE-(57,166),PRESET,BF:LI
NE-(196,166),PRESET:LINE-(197,13
2),PRESET,BF:LINE-(256,132),PRES
ET
40 LINE(0,144)-(22,144),PRESET:L
INE-(23,188),PRESET,BF:LINE-(230
,188),PRESET:LINE-(231,144),PRES
ET,BF:LINE-(256,144),PRESET
50 FORI=1TO70:PSET(RND(256),RND(
118)):NEXT:GOSUB150:GOSUB180
60 A$="GRAF2":PMODE4:SCREEN1,1:G
OSUB110
70 LINE(0,128)-(76,128),PRESET:L
INE-(77,153),PRESET,BF:LINE-(176
,153),PRESET:LINE-(176,128),PRES
ET,BF:LINE-(256,128),PRESET
80 LINE(0,138)-(40,138),PRESET:L
INE-(41,178),PRESET,BF:LINE-(216
,178),PRESET:LINE-(217,138),PRES
ET,BF:LINE-(256,138),PRESET
90 GOSUB150:GOSUB180
100 CLS:PRINT@236,"THE END":END
110 FORI=0TO256STEP2:LINE(I,120)
-(I,192),PSET:NEXT
120 LINE(96,120)-(156,140),PRESE
T,BF:LINE(96,140)-(20,192),PRESE
T:LINE(156,140)-(236,192),PRESET
130 LINE(96,120)-(0,152),PRESET:
LINE(156,120)-(256,152),PRESET
140 PMODE3:PAINT(126,168),2,1:RE
TURN
150 CLS:MOTORON:PRINT@229,"POSIT
ION A TAPE TO SAVE          GRAPH
ICS SCREEN.":PRINT@293,"THEN PRE
SS ENTER."
160 GOSUB170:MOTOROFF:PRINT@229,
"DEPRESS PLAY & RECORD":PRINT@26
1,"BUTTONS.":GOTO170
170 K$=INKEY$:IFK$<>CHR$(13)THEN
170ELSERETURN
180 IFPEEK(186)=6THENCSAVEMA$,&H
600,&H1DFF,0 ELSE:CSAVEM A$,&HE0
0,&H25FF,0
190 RETURN
```

Listing 3: *ANIMATE*

```
5 X=256*PEEK(27)+PEEK(28)-70:DEF
USR=X
10 PMODE4:Q=USR(2):SCREEN1,1
20 GOSUB30:Q=USR(1):GOSUB30:Q=US
R(2):GOTO20
30 FORI=0TO19:NEXT:RETURN
```



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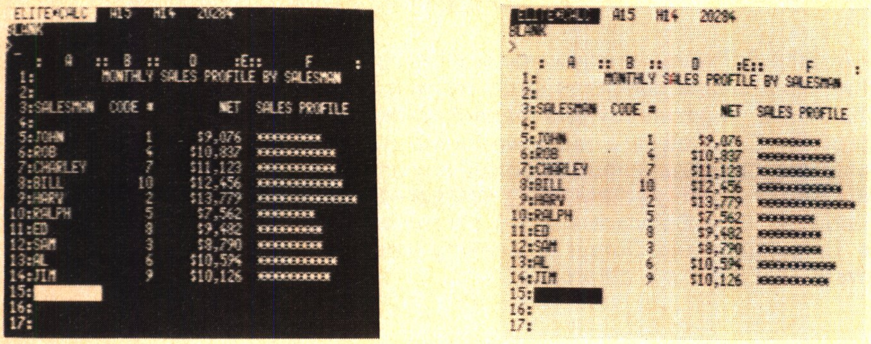
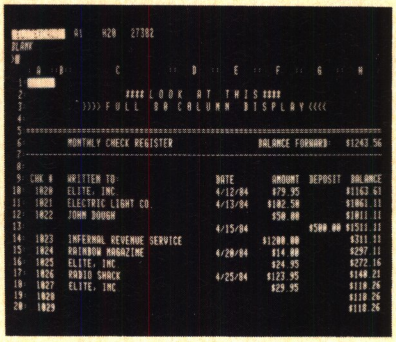


```
ELITE•CALC  A15  H14  20284
BLANK
>
 :  A  :: B ::   D     :E::     F     :
 1:          MONTHLY SALES PROFILE BY SALESMAN
 2:
 3:SALESMAN  CODE #           NET  SALES PROFILE
 4:
 5:JOHN         1         $9,076  *********
 6:ROB          4        $10,837  **********
 7:CHARLEY      7        $11,123  ***********
 8:BILL        10        $12,456  ************
 9:HARV         2        $13,779  *************
10:RALPH        5         $7,562  *******
11:ED           8         $9,482  *********
12:SAM          3         $8,790  ********
13:AL           6        $10,594  **********
14:JIM          9        $10,126  **********
15:
16:
17:
```

```
ELITE•CALC  A15  H14  20284
BLANK
>
 :  A  :: B ::   D     :E::     F     :
 1:          MONTHLY SALES PROFILE BY SALESMAN
 2:
 3:SALESMAN  CODE #           NET  SALES PROFILE
 4:
 5:JOHN         1         $9,076  *********
 6:ROB          4        $10,837  **********
 7:CHARLEY      7        $11,123  ***********
 8:BILL        10        $12,456  ************
 9:HARV         2        $13,779  *************
10:RALPH        5         $7,562  *******
11:ED           8         $9,482  *********
12:SAM          3         $8,790  ********
13:AL           6        $10,594  **********
14:JIM          9        $10,126  **********
15:
16:
17:
```

Elite Calc/3.0 offers TWO 51 character displays



```
             A1    H20   27382
BLANK
>0
  A ::B::       C        ::  D  ::  E  ::  F  ::  G  ::  H
 1:
 2:                ####L O O K   A T   T H I S####
 3:          >>>>F U L L   8 0   C O L U M N   D I S P L A Y<<<<
 4:
 5:=====================================================================
 6:      MONTHLY CHECK REGISTER                BALANCE FORWARD:  $1243.56
 7:---------------------------------------------------------------------
 8:
 9: CHK #   WRITTEN TO:                  DATE     AMOUNT  DEPOSIT  BALANCE
10:  1020   ELITE, INC.                4/12/84    $79.95           $1163.61
11:  1021   ELECTRIC LIGHT CO.         4/13/84   $102.50           $1061.11
12:  1022   JOHN DOUGH                            $50.00           $1011.11
13:                                     4/15/84            $500.00  $1511.11
14:  1023   INFERNAL REVENUE SERVICE            $1200.00            $311.11
15:  1024   RAINBOW MAGAZINE           4/20/84    $14.00            $297.11
16:  1025   ELITE, INC.                           $24.95            $272.16
17:  1026   RADIO SHACK                4/25/84   $123.95            $148.21
18:  1027   ELITE, INC                            $29.95            $118.26
19:  1028                                                           $118.26
20:  1029                                                           $118.26
```

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>
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>
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16K
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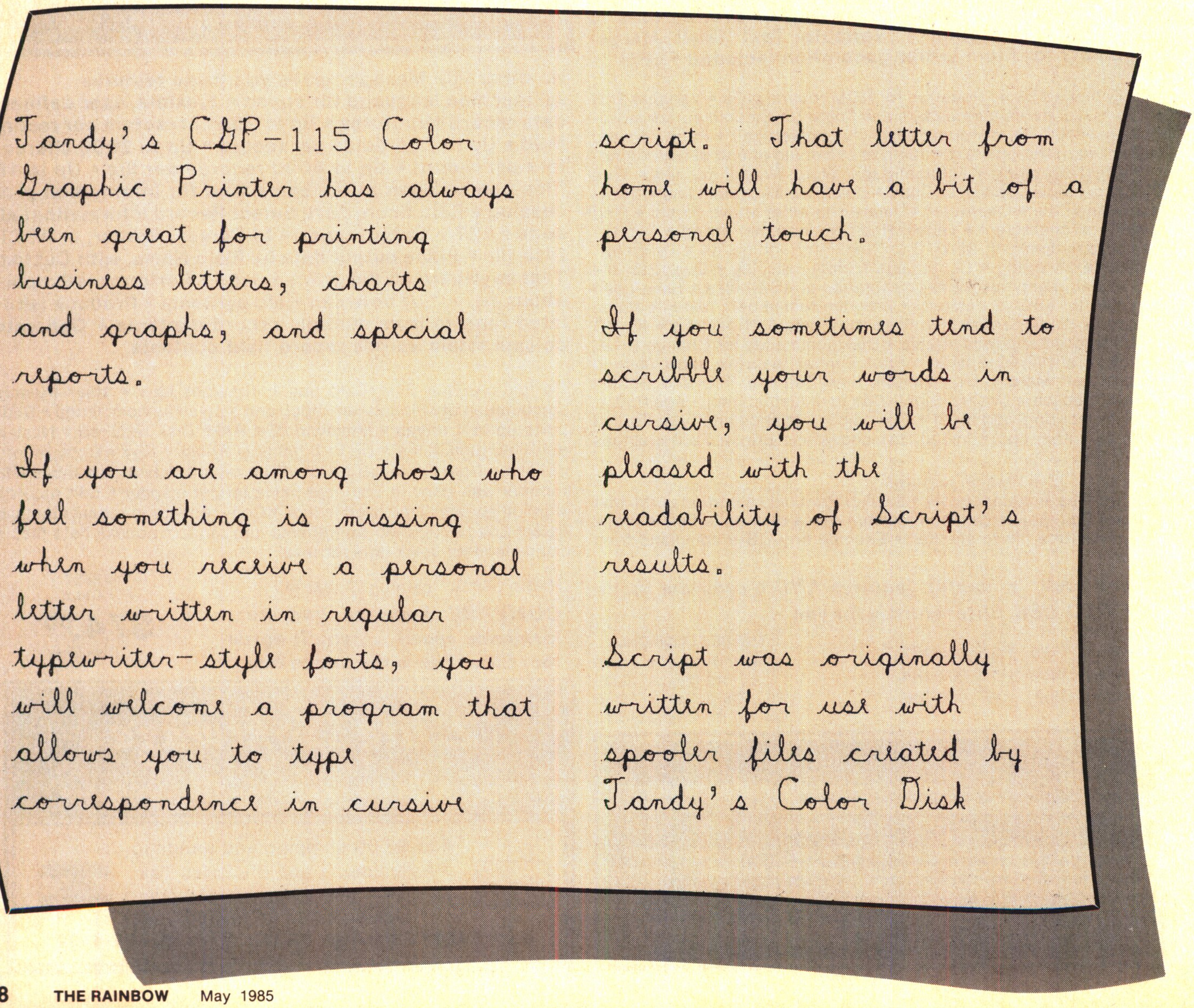
By Benjamin W. Brunotte



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If you are among those who feel something is missing when you receive a personal letter written in regular typewriter-style fonts, you will welcome a program that allows you to type correspondence in cursive script. That letter from home will have a bit of a personal touch.

If you sometimes tend to scribble your words in cursive, you will be pleased with the readability of Script's results.

Script was originally written for use with spooler files created by Tandy's Color Disk

SCRIPSIT, but most other CoCo word processors will work. Use a 27-character line length, and save the file with an extension of /SPL. When you run the program, type in the file name without the /SPL.

Those personal letters will be a joy to write!

-- Ben Brunotte

Editor's Note: This program ends with an IE (input past end of file) Error in line 200. This does not affect normal operation of the program.

If you have any questions about this program, you may contact Mr. Brunotte at 3155 French Rd., Apt. 218, Beaumont, TX 77706.

(Ben Brunotte works in operations at an oil refinery in Texas. He is a self-taught programmer and the CoCo is his hobby. He started five years ago with 16K BASIC and has upgraded over the years.)

		545	19
18	157	556	253
240	72	520	60
450	94	580	233
539	211	END	238

The listing: *SCRIPT*

```
5 GOTO 100
10 PRINT#-2,"J1,0,2,1,2,2,2,4":R
ETURN
11 PRINT#-2,"J6,0,1,1":RETURN
12 PRINT#-2,"J1,1,2,1,1,0,2,-1,-
2,1,-1,0,-2,-1,-1,-1,-1,-2,0,-1,
1,-3,2,-1":RETURN
13 PRINT#-2,"R13,24":PRINT#-2,"J
2,-2,2,-1,1,1,0,1,-5,1":RETURN
14 PRINT#-2,"R9,23":PRINT#-2,"J-
3,-2,-2,-1,-2,1,0,1,3,1,6,0,7,1"
:PRINT#-2,"R-7,-1":PRINT#-2,"J-1
,-20,-1,-2,-2,-1,-1,0,-2,1":RETU
RN
15 PRINT#-2,"R2,0":PRINT#-2,"J3,
2,2,2,2,4,2,7,1,5,0,1,-1,3,-1,0,
-1,-3,0,-2,1,-4,1,-2":RETURN
16 PRINT#-2,"J-2,-11,-1,-1,-1,0,
-1,2,0,2,1,2,2,3,2,2,3,1,1,0":RE
TURN
17 PRINT#-2,"R7,24":PRINT#-2,"J-
1,-2,-1,-1,-1,0,-1,1,0,1,1,1,2,1
,1,0":RETURN
18 PRINT#-2,"R11,24":PRINT#-2,"J
-1,0,-3,-1,-2,-2,-1,-2,-1,-6,0,-
2,1,-6,1,-2,2,-2,3,-1,1,0,3,1,2,
2,1,2,1,6,0,2,-1,6,-1,2,-2,2,-3,
1,-1,0,-3,-2,0,-2,1,-1,2,0,5,1,4
,4":RETURN
19 PRINT#-2,"R3,21":PRINT#-2,"J1
,0,2,1,1,1,0,1,-1,-24,-1,2,2,18,
1,3,2,1,3,0,3,-1,1,-1,1,-3,0,-1,
-1,-2,-2,-2,-3,-1,-6,0":RETURN
20 IF PV=72 OR PV=73 OR PV=98 OR
 PV=111 OR PV=118 OR PV=119 THEN
 PRINT#-2,"R0,-6"
21 RETURN
22 IF PV<65 THEN RETURN
23 IF PV<91 THEN 25
24 IF PV<97 THEN RETURN
25 PRINT#-2,"R4,0":T=T+4:RETURN
100 CLS:CLEAR 1000
110 PRINT#-2,CHR$(13);
120 PRINT#-2,CHR$(18)
130 PRINT#-2,"S2"
140 PRINT#-2,"R5,0"
150 PRINT#-2,"I"
160 T=5:PV=0
162 CLS:INPUT"ENTER scripsit SPO
OL FILE NAME";NM$
164 IF LEN(NM$)>8 THEN 162
166 NM$=NM$+"/SPL"
170 OPEN"I",#1,NM$
200 LINEINPUT#1,LL$
201 L=LEN(LL$):IF L=0 THEN 450
202 FOR W=1 TO L:V$=MID$(LL$,W,1
)
210 V=ASC(V$)
211 IF V=0 THEN 1000
230 IF V=13 THEN 450
240 IF V<32 OR V>122 THEN NEXT W
:GOTO450
250 PRINT V$;
260 IF V<65 THEN 360
270 IF V<91 THEN 330
```

```
280 IF V<97 THEN 360
300 IF PV=72 OR PV=73 OR PV=98 O
R PV=111 OR PV=118 OR PV=119 THE
N GOSUB 11 ELSE GOSUB 10
310 Z=V-96:ON Z GOTO 565,566,567
,568,569,570,571,572,573,574,575
,576,577,578,579,580,581,582,583
,584,585,586,587,588,589,590
320 GOTO200
330 GOSUB 20
340 Z=V-64:ON Z GOTO 533,534,535
,536,537,538,539,540,541,542,543
,544,545,546,547,548,549,550,551
,552,553,554,555,556,557,558
350 GOTO 200
360 GOSUB 20:GOSUB 22
370 PRINT#-2,"R0,-4":PRINT#-2,"P
"+V$
380 PRINT#-2,"R0,4":GOTO 419
410 T=T+10:GOTO 430
411 T=T+11:GOTO 430
412 T=T+12:GOTO 430
413 T=T+13:GOTO 430
414 T=T+14:GOTO 430
415 T=T+15:GOTO 430
416 T=T+16:GOTO 430
417 T=T+17:GOTO 430
418 T=T+18:GOTO 430
419 T=T+19
430 IF T=>460 THEN 450
440 PV=V:NEXT W:GOTO450
450 PRINT CHR$(13);
460 PRINT#-2,"H"
470 PRINT#-2,"R0,-37"
480 PRINT#-2,"I"
490 T=5:PV=0:GOTO200
533 PRINT#-2,"R17,22":PRINT#-2,"
J-1,1,-2,1,-2,0,-2,-1,-3,-3,-3,-
5,-1,-5,0,-2,1,-3,1,-2,2,-2,3,-1
,4,0,2,1,1,2,1,5,0,9,-1,5,-1,-5,
0,-9,1,-7,1,-1,1,0":GOTO 419
534 PRINT#-2,"R3,21":PRINT#-2,"J
2,1,1,2,-1,-22,1,-2,0,24,7,0,2,-
1,2,-2,1,-2,0,-1,-1,-3,-1,-2,-3,
-2,-4,0,-3,1,3,1,4,0,2,-1,2,-2,1
,-3,0,-2,-1,-3,-1,-1,-3,-1,-7,0,
1,1,3,1,5,-1,3,-1,1,0":GOTO 419
535 GOSUB 13:PRINT#-2,"J-2,0,-3,
-1,-2,-1,-2,-3,-1,-5,0,-4,1,-5,2
,-3,4,-2,9,0":GOTO 419
536 PRINT#-2,"R7,24":PRINT#-2,"J
-2,-24,-1,0,-1,1,0,1,1,0,3,-1,4,
-1,2,0,2,1,2,4,1,5,0,4,-1,5,-2,3
,-3,2,-6,0,-2,-1,1,-1,6,-1,4,1,4
,2":PRINT#-2,"R0,-24":GOTO 419
537 GOSUB 13:PRINT#-2,"J-3,0,-3,
-1,-2,-1,-2,-3,0,-2,1,-2,2,-2,4,
-1,5,0,2,1,-2,1,-6,0,-3,-2,-2,-2
,-1,-3,0,-3,1,-2,2,-1,4,-1,9,0":
GOTO 419
538 GOSUB 14:PRINT#-2,"J-1,3,0,1
,1,3,1,1,2,1,9,2,-1,-5":PRINT#-2
,"R3,-7":GOTO 419
539 GOSUB 15:PRINT#-2,"J2,-1,1,0
,3,1,1,1,-1,-5,-1,-3,-1,-3,-2,-2
,-2,-1,-2,0,-5,1,-1,1,1,1,6,-2,6
,-1,3,0":GOTO 419
540 PRINT#-2,"R6,22":PRINT#-2,"J
-1,-1,-1,0,-1,1,0,1,1,1,1,0,1,-1
,-1,-23":PRINT#-2,"R12,24":PRINT
#-2,"J-1,-24,1,1,0,7,-1,2,-11,1,
-1,-1,0,-1,1,-1,12,-1,2,-1":GOTO
 419
541 PRINT#-2,"R18,0":PRINT#-2,"J
-2,1,-1,1,-2,4,-2,6,-1,7,0,1,1,3
,1,1,1,0,1,-1,1,-3,0,-1,-1,-8,-1
,-5,-1,-4,-2,-2,-2,0,-2,1,-2,3,-
1,4,3,-1,5,-1,8,0":GOTO 419
542 PRINT#-2,"R11,0":PRINT#-2,"J
-4,5,-2,6,0,3,1,7,1,2,1,1,1,0,1,
-1,1,-2,1,-6,0,-3,-2,-12":GOSUB
16:GOTO 414
543 GOSUB 17:PRINT#-2,"J1,-1,-3,
-23":PRINT#-2,"R13,24":PRINT#-2,
"J0,-1,-3,-5,-7,-7,-1,0,-1,1,1,1
,1,0,2,-2,3,-5,2,-5,3,-1,1,0":GO
TO 419
544 PRINT#-2,"R3,23":PRINT#-2,"J
3,-1,4,-1,7,0,1,1,0,1,-1,1,-1,0,
-1,-1,-1,-5,-1,-6,-1,-4,-1,-3,-2
,-3,-3,-2,-2,0,-1,1,0,1,1,1,2,0,
2,-2,3,-1,6,-1,2,0":PRINT#-2,"R0
,1":GOTO 419
545 PRINT#-2,"R5,21":PRINT#-2,"J
-1,0,-1,1,0,1,1,1,1,0,1,-1,-1,-2
3,-1,2,2,21,2,1,1,0,2,-2,1,-18,-
1,-2,-1,2,1,18,2,2,1,0,2,-1,1,-2
2,1,-1,1,0":GOTO 419
546 GOSUB 17:PRINT#-2,"J1,-1,-1,
-23,-1,2,2,17,1,3,2,2,3,0,1,-1,1
,-3,1,-19,1,-1,1,0":GOTO 419
547 GOSUB 18:PRINT#-2,"R0,-24":G
OTO 419
548 GOSUB 19:PRINT#-2,"R13,-13":
GOTO 419
549 GOSUB 18:PRINT#-2,"R-8,-18":
PRINT#-2,"J6,-7":PRINT#-2,"R2,1"
:GOTO 419
550 GOSUB 19:PRINT#-2,"J1,1,5,-1
,2,-4,2,-8,1,-1,1,0":GOTO 419
551 GOSUB 15:PRINT#-2,"J4,-4,2,-
3,-1,-2,-2,-2,-3,-1,-2,0,-5,1,-1
,1,1,1,6,-2,6,-1,3,0":GOTO 419
552 GOSUB 14:PRINT#-2,"J-1,2,-1,
4,4,-1":PRINT#-2,"R12,-6":GOTO 4
19
553 GOSUB 17:PRINT#-2,"J1,-1,-1,
```

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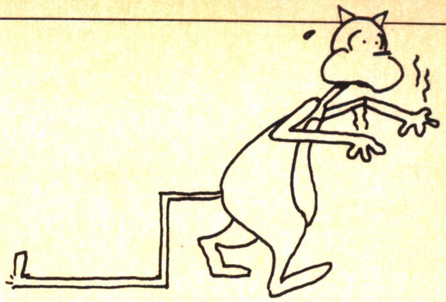

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```
-17,1,-3,1,-2,2,-1,3,0,2,1,1,2,1
,3,0,18,-1,-18,1,-6,1,0":GOTO 41
9
554 GOSUB 17:PRINT#-2,"J1,-1,1,-
3,2,-17,1,-3,1,0,1,3,2,17,1,3,1,
1,1,0":PRINT#-2,"R0,-24":GOTO 41
9
555 PRINT#-2,"R4,21":PRINT#-2,"J
-1,1,0,1,1,1,1,-1,-1,-20,2,-4,2,
0,2,4,2,16,-1,3,-1,-3,0,-16,2,-4
,2,0,2,4,1,20,1,1,1,0":PRINT#-2,
"R0,-24":GOTO 419
556 PRINT#-2,"R4,21":PRINT#-2,"J
-1,-1,-1,0,-1,1,0,2,1,1,1,0,3,-4
,2,-5,2,-6,2,-5,2,-4,1,0,1,1,0,2
,-1,1,-1,0,-1,-1":PRINT#-2,"R4,2
1":PRINT#-2,"J-1,0,-1,-1,-12,-22
,-1,-1,-1,0":PRINT#-2,"R16,0":GO
TO 419
557 GOSUB 17:PRINT#-2,"J1,-1,-1,
-17,1,-3,1,-2,1,-1,3,0,1,1,1,2,1
,3,2,15,0,3,-3,-24":GOSUB 16:GOT
O 419
558 GOSUB 17:PRINT#-2,"J2,-1,2,-
3,1,-2,1,-5,0,-2,-1,-4,-1,-3,-1,
-2,-3,-2,-1,0,-1,1,0,1,1,1,1,0,2
,-1,0,-2":GOSUB 16:PRINT#-2,"J2,
0":GOTO 419
565 GOSUB 12:PRINT#-2,"J2,0,2,1,
1,5,-1,2,0,-5,1,-2,1,-1,1,0":GOT
O 416
566 PRINT#-2,"J1,7,0,2,-1,4,-1,0
,-1,-4,0,-2,1,-7,1,-5,1,-2,2,0,1
,5,0,1,2,0":GOTO 413
567 GOSUB 12:PRINT#-2,"J6,0":GOT
O 415
568 GOSUB 12:PRINT#-2,"J2,0,2,1,
1,8,0,6,-1,5,-1,-4,1,-13,1,-2,1,
-1,1,0":GOTO 416
569 PRINT#-2,"J1,2,0,1,-1,1,-1,0
,-1,-1,0,-1,3,-8,1,-1,1,0":GOTO
410
570 PRINT#-2,"J2,6,0,2,-1,4,-1,-
1,-2,-24,1,-2,2,4,0,1,-1,2,-2,2,
5,-1,1,0":GOTO 411
571 GOSUB 12:PRINT#-2,"J2,0,2,1,
1,5,-1,2,-1,-15,-1,-1,-1,2,0,1,2
,4,3,1,1,0":GOTO 416
572 PRINT#-2,"J1,7,0,2,-1,4,-1,-
20,0,5,2,2,2,0,2,-2,0,-4,1,-1,1,
0":GOTO 414
573 PRINT#-2,"J0,2":PRINT#-2,"R0
,6":PRINT#-2,"J0,-1":PRINT#-2,"R
0,-5":PRINT#-2,"J0,-2,1,-4,1,-2,
1,-1,1,0":GOTO 411
574 PRINT#-2,"J0,2":PRINT#-2,"R0
,6":PRINT#-2,"J0,-1":PRINT#-2,"R
0,-5":PRINT#-2,"J0,-2,-1,-14,-1,
-1,-1,2,0,1,2,4,3,1,1,0":GOTO 41
0
575 PRINT#-2,"J1,6,0,3,-1,5,-1,0
,0,-21,0,8,1,1,3,0,1,-1,0,-3,-5,
0,3,0,2,-5,1,0":GOTO 413
576 PRINT#-2,"J1,7,0,2,-1,4,-1,0
,-1,-4,0,-2,1,-7,2,-6,1,-1,1,0":
GOTO 410
577 PRINT#-2,"J1,0,1,-1,-1,-6,0,
3,1,3,1,1,2,0,1,-1,0,-5,-1,-1,1,
6,1,1,2,0,1,-1,0,-5,1,-1,1,0":GO
TO 419
578 PRINT#-2,"J1,0,1,-1,-1,-6,0,
3,1,3,1,1,2,0,1,-1,0,-5,1,-1,1,0
":GOTO 415
579 PRINT#-2,"J2,1,1,0,-1,0,-2,-
1,-1,-2,0,-2,1,-2,2,-1,1,0,2,1,1
,2,0,2,-1,2,-2,1,-1,0,-1,-1,0,-1
,1,-1,5,1,1,0":GOTO 415
580 PRINT#-2,"J0,2,-1,-16,-1,-1,
-1,2,0,1,3,12,2,1,1,0,2,-1,1,-2,
0,-2,-1,-2,-2,-1,-4,0,1,1,7,-1,1
,0":GOTO 415
581 GOSUB 12:PRINT#-2,"J2,0,2,1,
0,7,-1,-14,1,-2,2,4,0,1,-1,2,-2,
2,4,-1,1,0":GOTO 417
582 PRINT#-2,"J0,1,1,-1,4,0,-1,-
3,0,-1,1,-2,1,-1,1,0":GOTO 414
583 PRINT#-2,"J1,3,1,-1,2,-4,0,-
1,-1,-3,-2,-1,-1,0,-3,2,3,-1,5,-
1,1,0":GOTO 413
584 PRINT#-2,"J0,8,-1,-8,2,-6,1,
-1,1,0":PRINT#-2,"R-8,11":PRINT#
-2,"J8,1":PRINT#-2,"R0,-12":GOTO
 410
585 PRINT#-2,"J0,2,-1,-6,1,-2,2,
-1,2,0,2,1,1,8,-1,-6,1,-2,1,-1,1
,0":GOTO 416
586 PRINT#-2,"J0,2,-1,-5,1,-3,1,
-1,1,0,1,1,1,3,1,5,0,-2,1,-1,1,0
":GOTO 414
587 PRINT#-2,"J0,1,-1,-7,1,-1,2,
0,1,1,1,5,-1,-2,0,-3,1,-1,2,0,1,
1,1,7,1,-2,1,0":GOTO 417
588 PRINT#-2,"J1,1,2,-1,1,-2,1,-
2,1,-2,1,-1,2,0":PRINT#-2,"R-2,8
":PRINT#-2,"J-6,-8":PRINT#-2,"R8
,0":GOTO 416
589 PRINT#-2,"J0,2,-1,-6,1,-2,2,
-1,1,0,2,1,1,2,0,6,-1,-17,-1,-1,
-1,2,0,1,2,5,2,1,1,0":GOTO 415
590 PRINT#-2,"J1,1,2,1,1,0,2,-1,
1,-2,0,-2,-1,-2,-1,-1,-2,-1,-1,0
,-1,1,1,1,1,0,2,-2,-1,-8,-1,-1,-
1,2,0,2,2,4,4,1,1,0":GOTO 416
1000 CLOSE#1:UNLOAD:END
```

16K ECB

At Your Request: Readers' Most Frequent Questions Answered

By R. Bartly Betts
Rainbow Contributing Editor
With Programs By Chris Bone

This column is being written the same month that the 51-column screen program appeared in the RAINBOW. I feel like a celebrity; never in my life have I had so many phone calls and letters. I was really pleased to get them, but I would be even more pleased if they hadn't resulted from a mistake in the 51-column screen article.

Part of the loading instructions was left out of the column, causing needless trouble, time and anxiety for many of you. In an effort to make amends, I have written the following BASIC program to load and execute the 51-screen program. So that I won't have to say and type "51-column screen" so often, I have now named the program *Bytescreen*, and my BASIC loader is saved under the name *BYTESCRN*. To install *Bytescreen*, I just type `RUN "BYTESCRN"` and ENTER.

Listing 1: ***BYTESCRN***
(To load 51-column screen on disk-based systems)

```
10 CLEAR1,&H7CC1 :REM ...change
this value to &h3cc1 for 16k mac
hines
20 CLEAR 300
30 LOADM"BYTESCRN
32 REM change LOADM to CLOADM fo
r tape systems
40 PMODE 4,1:SCREEN 1,0
50 EXEC &H7CC2:REM ...change thi
s value to &h3cc2 for 16k machin
es
60 CLS
70 S$=STRING$(28,"*")
80 PRINT TAB(14) S$
90 PRINT TAB(14) "* 51 column Sc
reen program *"
100 PRINT TAB(14) "*  Written by
: Chris Bone  *"
110 PRINT TAB(14) "*       for BY
TEMASTER      *"
120 PRINT TAB(14) S$
130 NEW
```

It was the `PMODE 4,1: SCREEN 1,0` that was left out of the loading instructions in the February listing. After you did everything the column said, you still only had a regular text screen, a flashing cursor and an OK prompt. I apologize for the trouble this has caused.

The Silver Lining

There is one good thing that came out of the problem, however. I had the chance to talk to, and hear from, a great many of you. I believe I have a better idea of the questions you have and the difficulties you are facing. Because of the many questions I received, I decided to use part of this column to answer a few of the most common

(R. Bartly Betts is currently a technical writer for Tandy Corp. and is a former news reporter and magazine editor. As the father of 10 children, computers are his escape from reality.

Chris Bone is a college computer science major and has been programming for more than three years. He averages between six and nine hours a day on the CoCo.)

ones. Here are some answers:

1) The program listing in THE RAINBOW is correct. If entered correctly, and loaded as shown at the beginning of this column, it works as advertised.

2) The program does work with graphics. You can write or modify a BASIC program to do such things as draw a graph, label the points and provide explanations, all on the same screen. As well as draw, you can use the `CIRCLE`, `LINE`, `PAINT`, etc., all combined with your new text characters.

3) While the CLEAR key does not clear the screen, you can accomplish this function with either the `CLS` command or a `PRINT CHR$(12)` command.

4) The majority of machine language programs you have, or would like to have, probably do not work with *Bytescreen*. If the machine language programs perform character output by using the ROM call at &HA002, you might be in luck. If it writes to the screen by loading the text screen memory locations from a register, nothing appears on the graphic screen.

In any case, *Bytescreen* does not work with a machine language program that loads or uses memory anywhere above &H7CC1. Machine language programs cannot overlap. (My personal experience is that very few machine language programs work together unless they were specifically designed to do so.)

5) It would be extremely difficult to patch programs, like a word processor or *EDTASM+*, to work with *Bytescreen*. Chris cannot take on the job of trying to do so.

6) The *Bytescreen* program is for you to use in any way you like for a noncommercial purpose. If you wish to use any of the code in a program you are creating for commercial purposes, you must obtain permission from Chris to do so.

7) It does not matter if you load *Bytescreen* before or after you load a BASIC program, as long as you do not use a BASIC loader, such as the one at the beginning of this article. Loading one BASIC program when another is in memory destroys the program in memory.

You can, however, load *Bytescreen* by following the `CLEAR 1,&H7CC1: CLEAR 300: LOADM` (or `CLOADM`) `"BYTESCRN": EXEC &H7CC2` routine. Remember, if you have a 16K machine, exchange &H7CC1 and &H7CC2 with &H3CC1 and &H3CC2.

8) I don't know what to do for those of you who wish to use the listings in our articles without having an editor/assembler. The reason I am writing these articles is to teach you how to write assembly language. If you are reading the articles, you should be interested in assembly language. On the other hand, I, too, was interested in what machine language programs could do before I felt ready to tackle assembly language programming.

For now, I have written a BASIC program that lets you poke machine language code directly into your computer's memorv (see Listing 2). Along with the program, I have included instructions on how to use it and how to save the results as a machine language program.

I know from experience that using such a program is hard to do. Making errors is easy, but finding them is difficult. With great amounts of care and checking, you can succeed. My program, called *Bytemaster Coder*, also helps you examine and change memory locations.

Chris and I have discussed writing a monitor program to give you options of examining and changing memory, examining registers, single stepping and the like. However, there have already been good monitor programs in THE RAINBOW. (In fact, there was one in the February issue, along with *Bytescreen.*) I have written the *Bytemaster Coder* because it is simple and easy to use and takes no special knowledge or techniques. At the same time, what it does is simple — it lets you examine and change RAM memory.

Because of the many who have expressed a wish to get started in machine language without an assembler, I am interrupting the planned flow of my columns for a bit to spend some time on the relationship between assembly language and machine language.

9) Because of the many letters and phone calls I receive, I will try and answer more of your questions in this column. This means there will be less room for instructions, but the topics should be of more immediate concern to you. I find that many of your questions are about some very basic assembly language problems and, as this column is for beginners, I think it would be best to clear up more of these points.

Also, I just don't have the time or money to answer so many letters. Many letters still don't have return postage, but I hate to be miserable and not answer them just because of a 20 cent stamp. I will still try to answer letters directly as much as possible, but you can expect some of my answers to appear in print.

10) No, I won't provide BASIC programs that automatically poke the assembly language programs we present into memory and execute them. We have to draw the line somewhere.

11) Yes, I do like Texas and I love the winters where temperatures never get below zero. But I can't understand why they don't install plumbing so pipes don't freeze in *above* zero weather!

12) The only way to learn assembly language is to do it. Start at a level you can handle and keep plugging away until you have it beat, then move up. There is no easy way. If you are dedicated, tutorial programs can help. If you are not dedicated, they waste your money. Assembly language is a prime example of the old saying, "You get what you pay for." In this case, the payment is time and determination.

All about Machine Code

Now, on to the matters at hand. As mentioned, I am going to spend some time on machine language code. I get the very distinct impression that there are many who do not really understand what machine language is, what assembly language is, or what to do with either one. I am going to give you the information you need to actually write a machine language program without the aid of an editor/assembler, and to know what you are doing.

Those of you who have an editor/assembler can follow along, too. This information is important to your understanding of assembly language as well. You can do assembly language programming without knowing about machine language code, but it definitely rounds out your education.

First, machine language is code that tells your computer what to do. Your computer would be a nice looking box of plastic and metal without it. Originally, computers had

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to be fed information using physical switches. A switch turned on created a value of one; a switch turned off created a value of zero.

It may help you to understand the concept if you think of bits and bytes as a type of Morse code. They are very close to the same thing. Instead of long and short beeps, machine language code uses ones and zeros, which are created by a high and low voltage level. Although home computers do not need you to flip toggle switches, they still work in the same way.

The switches that get your computer up and running are built into ROM chips and are permanently set either off or on. The central processing unit (CPU) in your computer reads the values of these switches (either zero or one). It is programmed (it also has switches) to perform certain acts, according to the message it gets from ROM.

The CPU receives data sequentially, that is, one instruction after another, just as Morse code is sent. However, unlike Morse code, it can accept eight bits (one byte) at a time, where Morse code has to be sent serially, one bit of the code at a time. Some computers have CPUs that can receive 16 bits or 32 bits at a time.

Talking in Machine Code

Now, with that background, let me say that you also can talk to the CPU — machine language is the way you do it. While ROM contains messages that cannot be changed, RAM is just a bunch of blank pages waiting to be filled. Your CPU can be told to read its messages from RAM just as well as from ROM. Thus, all you need to know is how to write its language — machine language. Machine language and machine code are the same thing.

When you write a program in machine language, it is called hand assembling. That is, you must either have memorized the codes to perform a certain function or you must look it up. For instance, the code to tell the CPU to load the 'A' register with a number is $86. That is 86 Hex or 134 decimal or 10000110 in binary (remember those switches?). This causes an immediate load of the 'A' register of the byte following this code.

For instance, if you wanted to load the 'A' register with the decimal number 10, you would write two bytes of code: 86 0A. If you have an assembler, it does the dirty work for you. It translates your commands into machine code (assembles them). The same instruction in assembly language is: LDA $0A.

The code to load the 'B' register with a specified number is $C6 or 198 decimal or 11000110. Feeding this code to the CPU is the same as if you had a bank of eight switches and turned on switches '7,' '6,' '2' and '1' (remember that the eight bits of a byte are numbered from zero to seven). Table 2 shows some more examples of machine language code as it relates to assembly language code.

As you can see, the list could go on and on. I won't use up more of this column's space on it, but any good assembly language book contains a similar and complete list of "op" codes.

Assembling in BASIC

How does all this help those of you who do not have assemblers? Well, your CPU doesn't really care how you create the codes that tell it what to do. These codes can come from a BASIC program just as well as from an assembler. In fact, you could write a BASIC assembler, if you wished, but it would be slow.

		MODE				
INSTRUCTION		IMMEDIATE	DIRECT	INDEXED	EXTENDED	INHERENT
ADD ACCUMULATOR B TO INDEX REGISTER X	ABX					3A
ADD WITH CARRY	ADCA	89	99	A9	B9	
INTO REGISTER	ADCB	C9	D9	E9	F9	
ADD MEMORY	ANDA	8B	9B	AB	BB	
TO REGISTER	ANDB	C4	D4	E4	F4	
	ANDD	C3	D3	E3	F3	
LOGICAL AND	ANDA	84	94	A4	B4	
REGISTER	ANDB	C4	D4	E4	F4	
	ANDCC	1C				
ARITHMETIC	ASA	48				
SHIFT LEFT	ASB	58				
	ASL		07	67	77	

All an assembler does is look at a mnemonic, such as LDA, and convert it to the proper numeric code, such as 86. It is the 86 that tells the CPU that it is to load the next byte presented to it into the 'A' register.

To see how this works, let's write a machine language program without an editor, assembler or anything but good old BASIC. The program uses the 'D' register to add two 16-bit numbers together. The numbers are $300 and $400.

Here are the codes you need to do the job:

1) The code to load a load a number in to the 'D' register is CC.
2) The code to add a number to the 'D' register is C3.
3) The code to store a number in memory from the 'D' register is FD.
4) The code to return to BASIC from the add routine is 39.

Now, from BASIC, type the following and ENTER after each line:

```
POKE &H3000,&HCC
POKE &H3001,&H03
POKE &H3002,&H00
POKE &H3003,&HC3
POKE &H3004,&H04
POKE &H3005,&H00
POKE &H3006,&HFD
POKE &H3007,&H04
POKE &H3008,&H00
POKE &H3009,&H39
```

And you have just written a machine language program. First, memory location $3000 was chosen so the program would work in any 16K and up computer. Then, the code to load the 'D' register with a number was poked into the first memory location. The next two numbers poked are the most significant byte and least significant byte of the number to be loaded: $03 and $00. The code to add a number to the 'D' register, C3, was then poked into the next memory location, &H3003. This process was carried through to the end of the program.

To see if the program works, type `EXEC &H3000` and ENTER. If all of your codes are right, a reverse '@' and an asterisk appears in the top-left corner of the video screen. If you are using *Bytescreen*, nothing appears (but it puts some unwanted values in *Bytescreen* if you are operating a 16K machine). You have to be in the regular text screen to see the results of the machine language program.

Clearing the Mystery

I hope that clears up the mystery of machine language code. Now let's deal with how to find the machine language code in an assembler program source listing, then how to use my BASIC program to make it much easier to enter code into memory. Below is an assembler listing of the previous program:

```
3000                 00000    ORG      $3000
3000  CC   0300      00010    LDD      #$300
3003  C3   0400      00020    ADDD     #$400
3006  FD   0400      00030    STD      $400
3009  39             00040    RTS
           0000      00050    END
```

If you look closely, you see that this listing contains all of the numbers you previously poked into memory from BASIC. They are found in the second and third columns. The first column is the memory location where the code goes, the second column is the machine language code and the third column is the values the code acts upon, or the operands.

What you do is put all of the values starting at CC into successive memory locations. Numbers with four digits require two memory locations. If you can do this without making mistakes, you have accomplished everything that an assembler does.

To enter the above program, you start at memory location &H3000 and enter the Hex values `CC 03 00 C3 04 00 FD 04 00 39` into $3000 through $3009. The following BASIC program is designed to make that task much easier. This gives those of you who do not have assemblers a chance to try out our codes.

Also, note that the previous assembly language listing has a beginning line using ORG. This tells you where the program is to begin in memory, in this case $3000. You can also tell that the execution address is also at $3000. The beginning and execution addresses are not always the same, but you are usually told if they are different. The end of the program is where the last program code ends ($3009 in the sample program).

Listing 2: A BASIC Program to enter Machine Language Code

Enter and run the program. You are prompted to enter the starting address; type in and enter the address where you wish your machine language code to begin.

Twenty-four memory location values are to be printed to the screen, beginning at the starting address. Use the arrow keys to move anywhere in these 24 bytes and make any changes you wish. If you try to go beyond the memory locations displayed on the screen, the display automatically increments or decrements by 24 bytes. Any changes you make are to be poked into the memory location displayed to the right of the 24 bytes.

To enter a machine language program, look for the proper values in the assembled listing, choose the memory location indicated by the program and begin typing in the values.

When all of the code is entered, use the CLEAR key to escape to the saving procedure. You are asked for a beginning address, an end address and the execution address. Enter these values as indicated by the assembly language listing and as explained in this article. The code is saved as a machine language program and can be placed into memory with `CLOADM` or `LOADM`.

```
100 ......194
360 .......42
500 .......95
660 ......206
END ......41
```

Listing 2: *BYTECODR*

```
1 '*****************************
2 '*      BYTEMASTER CODER     *
3 '*     BY R. BARTLY BETTS    *
4 '*       2251  LIPSCOMB      *
5 '*     FORT WORTH,  TEXAS    *
6 '*            76110          *
7 '*****************************
8 'USE THIS PROGRAM TO INPUT
9 'MACHINE LANGUAGE CODE INTO
10 'MEMORY.  THE FOLLOWING KEYS
11 'ARE ACTIVE:
12 'RIGHT ARROW = AHEAD 1 BYTE
13 'LEFT ARROW = BACK 1 BYTE
14 'UP ARROW = BACK 8 BYTES
15 'DOWN ARROW = AHEAD 8 BYTES
16 '<-> OR <=> = BACK 24 BYTES
17 '<+> OR <;> = AHEAD 24 BYTES
18 '<CLEAR> = PREPARE TO SAVE
19 'THE NUMBER KEYS AND THE
20 'ALPHABET CHARACTERS "A - "F
21 'CAUSE A VALUE TO BE PUT
22 'INTO MEMORY
24 '
25 '
100 CLS
110 V=32
120 DIM M(24)
130 A$(1)="BYTEMASTER CODER"
140 A$(2)="BY R. BARTLY BETTS"
150 A$(3)="JANUARY :: 1985"
155 '      SET UP SCREEN AND
156 '      GET ADDRESS
160 FOR T=1 TO 3
170 PRINT TAB(16-LEN(A$(T))/2) A
$(T)
180 NEXT
190 GOSUB 790
200 PRINT@V*12," START ADDRESS I
N HEX";
210 INPUT BG$
220 B=VAL("&H"+BG$)
230 BB=B
240 FOR T=0 TO 23
250 PRINT@M(T),HEX$(PEEK(BB))
```

```
260 BB=BB+1
270 NEXT T
290 A$=CHR$(128):B$=CHR$(32)
300 P=0
305 '      KEYBOARD INPUT
306 '      TO EXAMINE AND CHANGE
310 IF P>23 THEN P=0:B=B+24:GOTO
 230
320 IF P<0 THEN P=0:B=B-24:GOTO
230
330 M=M(P):C=PEEK(M+1024):H$=""
340 PRINT@187,HEX$(B+P);
350 IF C>63 THEN G=C-64 ELSE G=C
+64
355 '      WAIT FOR KEYPRESS
356 '      AND PRODUCE CURSOR
360 K$=INKEY$:POKE M+1024,G: IF
K$="" GOTO 360
370 POKE M+1024,C
375 '      LOOK FOR VALID
376 '      KEYPRESS
380 IF K$=CHR$(94) THEN P=P-8:GO
TO 310
390 IF K$=CHR$(10) THEN P=P+8:GO
TO 310
400 IF K$=CHR$(8) THEN P=P-1:GOT
O 310
410 IF K$=CHR$(9) THEN P=P+1:GOT
O 310
420 IF K$=CHR$(12) THEN 660
430 IF K$="+" OR K$=";" THEN B=B
+P+24:GOTO 230
440 IF K$="-" OR K$="=" THEN B=B
+P-24:GOTO 230
450 IF K$="N" THEN RUN
455 '      LOOK FOR INVALID
456 '      KEYPRESS
460 IF ASC(K$)<48 OR ASC(K$)>70
THEN 360
470 IF ASC(K$)>57 AND ASC(K$)<65
 THEN 360
475 '      INCREMENT MEMORY
476 '      IF END OF DISPLAY
480 IF P<0 THEN B=B-24:P=1:GOTO
230
490 IF P>24 THEN B=B+24:P=1:GOTO
 230
495 '      PRINT TO SCREEN
496 '      AND GOT TO NEXT CHAR
500 PRINT@M,K$;
510 H$=H$+K$
520 M=M+1
525 '      ROUTINE FOR SECOND
526 '      CHARACTER INPUT
530 C=PEEK(M+1024)
540 IFC>63 THEN G=C-64 ELSE G=C+
```

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```
64
550 POKE M+1024,G
560 K$=INKEY$:IF K$="" THEN 560
570 IF ASC(K$)<48 OR ASC(K$)>70
THEN 560
580 IF ASC(K$)>57 AND ASC(K$)<65
 THEN 560
590 POKE M+1024,ASC(K$)+64
595 '      ADD UP INPUT VALUES
596 '      AND POKE IN MEMORY
600 H$=H$+K$
610 PK=VAL("&H"+H$)
620 POKE B+P,PK
630 PRINT@M-1,HEX$(PK);
640 P=P+1
650 GOTO 310
655 '      SAVE PROGRAM TO
656 '      TAPE OR DISK ROUTINE
660 CLS
670 A$(1)="BYTEMASTER CODER"
680 A$(2)="==================="
690 FOR T=1 TO 3
700 PRINT TAB(16-LEN(A$(T))/2) A
$(T)
710 NEXT T
720 PRINT@V*4+2,"* START (HEX)..
.";:INPUT BM$:BM=VAL("&H"+BM$)
730 PRINT@V*5+2,"* END (HEX)..."
;:INPUT EM$:EM=VAL("&H"+EM$)
740 PRINT@V*6+2,"* EXECUTION (HE
X)...";:INPUT EA$:EA=VAL("&H"+EA
$)
750 PRINT "NAME OF PROGRAM...";:
INPUT NP$
760 REM USE THIS LINE FOR DISK:
SAVEM NP$,BM,EM,EA
770 REM USE THIS LINE FOR CASETT
E:CSAVEM NP$,BM,EM,EA
780 END
785 '      DATA FOR POSITION
786 '      OF SCREEN DISPLAY
790 FOR X=160 TO 224 STEP 32
800 FOR T=0 TO 21 STEP 3
810 M(X/4-40+T/3)=X+T
820 NEXT T,X
830 RETURN
```

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RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings you will find in THE RAINBOW are formatted for a 32-character screen —so they will show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on listings indicates that program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

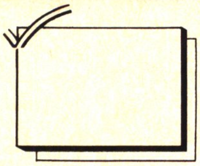
What's A CoCo

CoCo is an affectionate name which was first given to the TRS-80 Color Computer by its many fans, users and owners. As such, it is almost a generic term for three computers, all of which are very much alike.

When we use the term CoCo, we refer to the TRS-80 Color Computer, the TDP System-100 Computer and the Dragon-32 Computer. It is easier than using the three "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and TRS-80 Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small boxes that you see accompanying programs in the THE RAINBOW are the "Check system," which is designed to help you type in programs accurately.

Rainbow Check PLUS will count the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use the *Rainbow Check PLUS,* type in the program and CSAVE it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW ENTER to remove it from the area where the program you're typing in will go.

Now, whenever you press the down arrow key, your CoCo will give you the checksum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure that you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
      ‘‘DATA ERROR’’:STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine Language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so that you can operate them.

The easiest way is by using an Editor-Assembler, a program you can purchase from a number of sources.

An editor-assembler allows you to enter mnemonics into your CoCo and then have the editor-assembler assemble them into specific instructions that are understood by the 6809 chip that controls your computer.

When you use an editor-assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW'S listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand assemble some programs.

Use the following program if you wish to hand assemble machine language listings:

```
10 CLEAR200,&H3F00:1=&H3F80
20 PRINT ‘‘ADDRESS:’’;HEX$(I);
30 INPUT ‘‘BYTE’’;B$
40 POKE I,VAL(‘‘H’’+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00`.

The Rainbow Seal

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The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product which carries the Seal has been physically seen by us and that it does, indeed, exist.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal. This lets you know that we have seen the product and that it does, indeed, exist.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

This program helps children become familiar with coordinate geometry

A Geometric Treasure Hunt

By Steve Blyn
Rainbow Contributing Editor

This month we will present a potentially confusing topic in a light, non-threatening manner. Coordinate geometry is a subject that often gives students problems in the higher grades. It is, fortunately, a topic that can easily be introduced in second through fourth grades. It is always wise to present a topic early to children. The problem is to find a way to introduce it on their level.

We will try to provide a method for children to learn to locate and work with pairs of points on a grid. The grid or matrix that we will be using has seven columns and five rows.

It looks like this:

		1	2	3	4	5	6	7
1	!	?	?	?	?	?	?	?
2	!	?	?	?	?	?	?	?
3	!	?	?	?	?	?	?	?
3	!	?	?	?	?	?	?	?
4	!	?	?	?	?	?	?	?
5	!	?	?	?	?	?	?	?

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

Extra directions for this grid will be similar to those of a map. They are:

```
        NORTH
          !
          !
WEST__________EAST
          !
          !
        SOUTH
```

Somewhere in this grid there is a treasure. Each round it will be hidden in a different place. The child's job is to guess the location of the hidden treasure within five moves.

Clues will be given in the form of messages about which direction to move on your next guess. The directions, north, south, east and west as well as the four combinations NW, NE, SW and SE are used as clues.

It is best to review directions with the child before beginning this program. The child may practice facing in all of the directions. Locating the eight directions in any familiar room is also good preparation for this program.

To check out any location for treasure, we must know the column and row number. This corresponds to the 'X' and 'Y' axis coordinates in the child's later studies.

Each position is composed of two numbers separated by a comma. The columns, or horizontal number, precedes the row's vertical number. This convention is also true in plotting or locating points on computers. Position 6,2 would therefore be six spaces over and two spaces down.

Let us suppose the treasure is really hidden this time at location 3,5. The clue to a guess of 6,2 would be to move to the southwest. This is because the treasure is to the west (left) and to the south (below) of our guess. The guessing proceeds in this manner until it is found or the five guesses are used up.

After playing this game for a while, a strategy of guessing should evolve. The best initial guess is the middle position (4,3). The second guess should be two spaces over in the direction of the clue. This method helps narrow down the remaining possibilities. Younger children, of course, may not be ready for much strategy and may merely play for the fun and experience.

Lines 40-50 dimension our grid to five by seven. Other sizes could be experimented with. We chose this size because it fit so neatly on the CoCo's screen. We also wanted to limit the size to proportions that younger students could handle. Larger grids could easily be tried with older students.

Lines 160-390 draw the matrix and the directional names. Line 290 fills the matrix with question marks. You may change this to any symbol or character string (`CHR$`) that suits your fancy. The Y$ on Line 190 represents this option.

Lines 400-520 ask for and print out your guess. The location you guess is printed out on the grid on Line 490. `CHR$(134)` is used to represent your answer. You may change the X$ on Line 190 if you wish to alter this symbol.

Lines 500 and 510 check to see whether you have won or lost yet. If you wish to change the number of guesses permitted, alter the amount on Line 510. We have set a loss when CT=5 guesses. A good player will always be able to win within five tries.

You will have a much more challenging game if you lower the level to CT=4 or CT=3. On the other hand, five guesses may not be enough for young players. The level of CT should then be raised to six or seven.

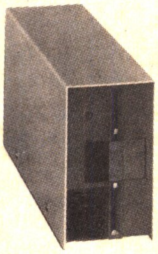
The computer's reaction to your guess is contained on lines 80-160. A directional clue will be given to the player. This will help determine the next guess. After playing for a while, the student will most probably begin to develop the best strategies for successive guesses.

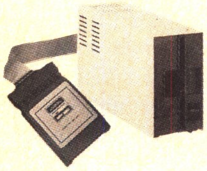
Similar search games have been around for quite a while under various names. We have tried to make this adaptation as useful and modifiable as possible for your purposes. We hope your children and students both learn from and enjoy this game.

250 217
500 19
END 73

The listing: *TREASURE*

```
10 REM"FIND THE TREASURE"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1985
30 CLEAR 1000:CLS0
40 DIM M$(5,7)
50 R=5:C=7:CT=0
60 GOSUB170
70 GOSUB400
80 REM"REACTION TO YOUR GUESS"
90 PRINT@416," ":PRINT @416,"CHA
NGE DIRECTION TO ";
100 IF Y=B THEN 130 ELSE IF Y<B
THEN 120 ELSE PRINT"NORTH";
110 GOTO 130
120 PRINT"SOUTH";
130 IF X=A THEN 160 ELSE IF X<A
THEN 150 ELSE PRINT"WEST"
140 GOTO 160
150 PRINT"EAST";
160 GOTO 70
170 A=RND(C):B=RND(R):REM" HIDE
```





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```
THE TREASURE"
180 REM" PRINT OUT THE GRID AND
DIRECTIONALS"
190 X$=CHR$(134):Y$="?"
200 FOR R=1TO7
210 FOR C=1TO5
220 R$(C,R)=Y$
230 NEXT C,R
240 PRINT@0,"        FIND THE TRE
ASURE"
250 PRINT"    1   2   3   4   5
  6   7"
260 FOR R=1TO5
270 PRINTUSING"#";R;
280 FOR C=1TO7
290 PRINT"   ";"?";
300 NEXT C
310 PRINT
320 NEXT R
330 R$="":C$=""
340 PRINT@224,STRING$(32,243);
350 PRINT@268,"NORTH";
360 PRINT@297,"WEST-+-EAST";
370 PRINT@332,"SOUTH";
380 PRINT@352,STRING$(32,252);
390 RETURN
400 REM"YOUR GUESS"
410 R$="":C$=""
420 PRINT@384," ":PRINT@384,"ENT
ER (COLUMN,ROW)";
430 INPUT C$,R$
440 IF C$="" OR R$="" THEN 420
450 IF ASC(C$)>55 OR ASC(R$)>53
THEN 420
460 RR=VAL(R$):CC=VAL(C$)
470 IF CC>C OR RR>R OR CC<1 OR R
R<1 THEN 420
480 CT=CT+1
490 PRINT@(32*RR)+2*(CC*2)+32,X$
;
500 IF CC=A AND RR=B THEN 530:'
A WIN
510 IF CT=5 THEN 550: ' A LOSS
520 X=CC:Y=RR:SOUND100,2:RETURN
530 PRINT@384,"       CONGRATULA
TIONS":PRINT:PRINT"    YOU FOUND
IT IN";CT;"MOVE";:IF CT>1 THEN P
RINT"S."
540 FORT=100TO240STEP20:SOUND240
,2:NEXTT:GOTO560
550 PRINT@384,"SORRY THAT WAS 5
MOVES.":PRINT"THE CORRECT ANSWER
 WAS"A","B
560 PRINT@484,"DO YOU WANT TO TR
Y AGAIN?";
570 EN$=INKEY$
580 IF EN$="" THEN 570
590 IF LEFT$(EN$,1)="Y" THEN RUN
 ELSE CLS:END
```

The Handicapper

Improve your performance at the track! These 16K programs for Thoroughbred, Harness and Greyhound racing let you rank the horses or dogs in each race quickly and easily, even if you've never handicapped before! All the information you need is readily available from the Racing form, thoroughbred or dog track program. We even provide a diagram showing you where to find it!

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The RAINBOWfest Reporter

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Prospect, Kentucky **May 1985** **Vol. I No. I**

Irvine Show Attracts 8,000 Persons

IRVINE, Calif. — A dazzling array of new products, free seminars, great bargains, CoCo experts and record high temperatures for Southern California attracted more than 8,000 persons to RAINBOWfest Irvine in February.

All weekend, the exhibit hall at the Irvine Marriott was jammed with enthusiastic attendees literally standing shoulder-to-shoulder at many exhibits.

Delighted participants were treated to demonstrations of more than 30 new products, including such recent releases as Colorware's *CoCo Max*, GRAFX's *VIZIDRAW*, Tom Mix Software's *P-51 Mustang Flight Simulator* and Derringer Software's revised *Pro-Color-Series*.

Dozens of questions were answered by experts during seminars, but the greatest interest appeared to be in the new OS-9 operating sysem. Seminars conducted on BASIC09 and OS-9 by Dale L. Puckett, author of the recently released book, *The Complete Rainbow Guide To OS-9*, exceeded the capacity of the room on both occasions.

"It's like walking through the pages of THE RAINBOW," said one attendee. "I've received a lot of valuable advice and tips, and obtained some incredible software at unbelievably reasonable prices."

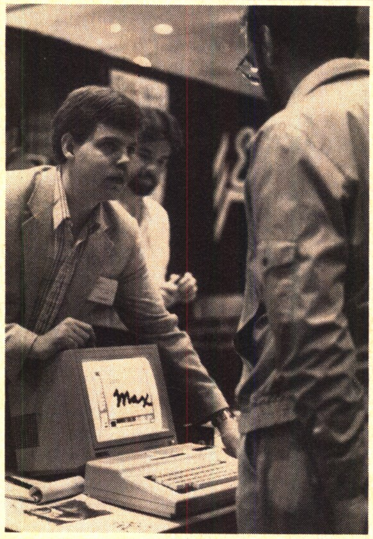
Among the bargains were the show specials at the Tandy booth where 16K CoCos were selling for $49.95 and $84.95 (with Extended Color BASIC). Spectral Associates was offering a space game package valued at $225 for only $49.

An added bonus was the 90-degree temperature, the highest ever in February for sunny California, according to some members of the South Bay Color Computer Club, which served as the host club.

The next RAINBOWfest is scheduled May 17-19 at the Hyatt Regency Woodfield in Chicago, where the first show was held in 1983.

The exhibit hall of the Irvine Marriott was jammed to capacity as members of the CoCo Community viewed new products.

CoCo Max Makes Splash In Sea Of New Products



Tim Jenison, developer of *CoCo Max* for Colorware, was kept busy demonstrating the product.

Crowds were consistently large at the Colorware exhibit where the dynamic *CoCo Max* graphics creation program was "wowing" spectators with its capabilities. It is a combination of hardware and software, providing many of the features of Apple MacIntosh, complete with icons, pull-down menus, full graphics editing and font styles.

"Many persons told us *CoCo Max* was the hit of the show," said Jack Knott, company president. "They simply could not believe the number of features, the speed and the way things can be moved around so easily on the monitor. It is 10 times as friendly as any graphics creation program on the market for the CoCo."

Demonstrating the program during a seminar was Colorware's chief engineer and programmer, Tim Jenison, who worked full time on its development for seven months.

"No other product for our computer has had as much time, money and effort invested in it," said Knott. "We don't create many products during a year, but when we do, they are very, very good."

RAINBOWfest attendees agreed wholeheartedly, purchasing more than 250 copies of the program, according to Knott.

Knott noted that the company currently is working on a cassette version of the program, as well as a variety of printer drivers for different kinds of printers.

Kaplan: OS-9 Will Lead To More Powerful CoCo

By Dale Puckett

While he didn't give away any secrets about bigger and better OS-9 Color Computers, Kenneth Kaplan had plenty of praise for Tandy's low cost, entry level machine during his keynote speech at the CoCo Community Breakfast.

"The Color Computer is a solid and stable machine," said Kaplan, the president of Microware Systems Corporation, the company that adapted OS-9 for CoCo. "It's also backed by a company with the talent and resources to keep it alive in today's competitive marketplace."

Tandy's Color Computer product manager Barry Thompson wasn't frowning as Kaplan told the breakfast crowd that Tandy sees OS-9 as a bridge to future Color Computers. But, why does the company see it that way?

"OS-9 separates application software from the hardware itself, unlike Microsoft BASIC running on C/PM or other operating systems. Besides, the 6809 is an excellent microprocessor that outperforms the 8808 by a wide margin. BASIC09 gives you a chance to beam with pride as you tell your IBM-bound friends how far it outperforms Microsoft BASIC on their PC."

Keynote speaker Ken Kaplan is the president of Microware Systems Corporation, the company that adapted OS-9 for the Color Computer.

Kaplan also noted that the 6809 gives you an architecture you can expand. "Tell your friends that you were running a 16-bit microprocessor on your Color Computer long before 16 bits were in vogue. In fact, if I were you, I would take all the hype about 16-bit machines with a grain of salt.

"Every once in a while I get a call from someone who thinks that our 68000 BASIC09 is too slow when it is compared to the 6809 version," he continued. "That's not the problem. The 6809 is too good! That's why the Color Computer with OS-9 far surpasses all others in its class."

Kaplan reported that Microware is working closely with Tandy to make Color Computer BASIC09 and OS-9 easier to adapt, customize and use, noting specifically that his programmers are working hard on new keyboard drivers, video drivers and drivers for other new devices. He said that in the future the Color Computer will most likely have more memory, a factor that will enhance its graphics capability. It also means Color Computer applications will get more powerful.

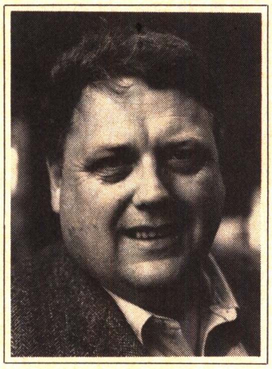
He also suggested that software developers should write new products in a language running under OS-9. "There are many really exciting tools you can use, including C which is being used by most developers today. If you use C under OS-9 on the Color Computer, you also will be able to get into other new markets.

Visitor From Norway Says Show Worth Trip

Traveling thousands of miles to attend RAINBOWfest-Irvine was Capt. Tore Bjorn Torp, a computer programmer for the Royal Norwegian Air Force.

Capt. Torp, who heads the air force's data office in Kjeller, said he had been planning the trip to California for several months, just so he would be able to attend RAINBOWfest.

"The show is everything I thought it would be," he said. "Don't be surprised if a few more Norwegians make it to future shows."



Capt. Tore Bjorn Torp

Lunar Landing Games Retain Their Appeal

Saguaro Software's Andy Ervin discovered that lunar landing Simulations still capture the fancy of CoCo enthusiasts. *Eagle* was among the more popular programs at his exhibit.

Capturing almost as much attention, however, was *Sketchpad*, the graphics program used to create *Eagle*. "People are fascinated with the ability to create their own graphics," said Ervin.

Tom Mix Introduces New Flight Simulator

You can always count on Tom Mix to come up with the innovative and unusual for RAINBOWfest!

For Irvine, Tom introduced the *P-51 Mustang Attack Flight Simulator*, a fast-moving arcade Simulation of a "dog fight" during World War II.

Two computers were linked together via an RS-232 cable, pitting two contestants in an aerial battle to the end. The sounds of "rat-a-tat-tat" and "ka-boom" echoed throughout the show.

The Simulation also can be played on modems, allowing you to test your skills against anyone in the country.

Elite Revises Programs For 80-Column Format

"Everybody's going to 80 columns," reported Mike Giza of Elite Software as he demonstrated revised versions of *Elite-Word, Elite-Calc* and *Elite-Spel.*

Giza noted that the programs run with the 80-column *Word-Pak* hardware manufactured by PBJ, Inc.

Utilities And Hardware Lead Spectrum Sales

"Utilities and hardware are the best sellers of the show," reported Bob and Paul Rosen of Spectrum Projects, which displayed several printers and modems, along with various software and hardware packages.

"The Gemini SG-10 printer is replacing the 10X. It has proportional spacing and a good correspondence mode, as well as all of the 10X's features," said Paul.

Spectrum also unveiled *The Solution*, an OS-9 utility which makes the system menu driven by adding one-letter commands for the most used features.

Wayne Day, SYSOP of The Color SIG, demonstrates advantages of the system during RAINBOWfest.

Color SIG Online At Irvine

One of the first messages appearing on CompuServe's Color SIG during the weekend of February 15-17 was from none other than Lonnie Falk, editor and publisher of THE RAINBOW, extolling the virtues of the record-high temperatures in Southern California. The 80- to 90-degree temperatures were quite a switch from Prospect, Ky., where the thermometer was frozen at five degrees.

That message, along with all of those on the system that weekend, were displayed on a six-foot screen at RAINBOWfest where SYSOP Wayne Day was operating The Color SIG.

Wayne fielded several questions about *EASYPLEX*, the new electronic mail system on the CompuServe Information Service. "Once you get used to the new system, it is fantastic," said Day. "We have had a lot of new users on the system because of the Irvine exposure."

VIZIDRAW Attracts Graphics Aficionados

Graphics lovers were in for a treat at the GRAFX exhibit where *VIZIDRAW*, a software-only graphics processor, was making its debut.

The program is written in Extended BASIC and provides nearly all of the graphics power already available in the ROMs, along with many machine language routines to support special operations not normally available.

VIZIDRAW, a package of two disks, also includes a wide diversity of 30 different type fonts, creating a stimulating diversion for many RAINBOWfest attendees.

New Word Processor For OS-9 Users

The *Stylograph III* word processing system was demonstrated by the Great Plains Computer Company. Available for OS-9 systems, the software interfaces extremely well with the company's *Spelling Checker* and *Mail Merge*.

RGS Micro Unveils Expansion Cards

A 68008 card for the Color Computer was unveiled by RGS Micro Electronics, which describes the card as the ultimate upgrade.

The card comes complete with a Centronics parallel port, eight, 16 and 32-bit processing, 2K static variable storage, direct memory access to and from the computer, 4K monitor EPROM, co-processor mode and a host/terminal mode.

CoCo Graphics Shine On Tandy 1000, Too

Color Computer graphics on the Tandy 1000? Visitors to the Mark Data Products exhibit were doing double takes as such popular graphics Adventures as *Shenanigans* and *Calixto Island* were demonstrated.

"We had to rewrite all of the assembly language programs for the 1000, but there was very little difference in the quality," said Ron Krebs, president of Mark Data.

Krebs revealed that the company will soon be marketing *CoCo Util*, an innovative utility program that will transfer ASCII text files from the Color Computer to MS-DOS machines. "You would be surprised at how many people are interested in such a program," he said.

Prickly-Pear's Owners Pleased With Attendance

Experiencing their first RAINBOWfest as exhibitors were Joanne and Mike Chintis, who purchased Prickly-Pear from Bill and Sara Nolan in November.

"It really is exciting," said Joanne. "We've learned a lot and met a lot of people. I never dreamed there would be so many here."

They were particularly pleased with sales of a new graphics Adventure, *To Preserve Quandic*, which is 300K long and requires two disks. "It's about time-machine travel," she said.

Grantham Displays Multi-User Calendar

Flipping through the pages of Grantham Software's *CALINDEX* proved a popular pastime for many attendees at RAINBOWfest. The BASIC program provides multiple calendars on one database with varying levels of password protection. Up to 15 calendars can be managed by the master calendar.

J&M's New Controller Solves Problems

A prototype of a new disk controller that solves many of the problems CoCo owners have been having with the previous version was displayed by J&M Systems.

Two ROM sockets allow the use of J-DOS and Disk BASIC, and a switch for selecting the disk operating system. There's even a parallel port for printers.

New Numeric Keypad For CoCo Accountants

MORE KEYS, a 15-key numeric pad for the Color Computer, was among the many products exhibited by Moreton Bay Software.

"A keypad is almost essential for serious accounting," said John Neilsen. "This quality accessory makes possible the obvious advantage of rapid numeric entry that CoCo needs for business use."

Among other products demonstrated by Moreton Bay were *Trivia And Some Significa*, a game with more than 2,000 questions, and the graphics Adventure, *Sam Diamond, P. I.*

Seven New Font Styles For *CoCo Calligrapher*

An OS-9 version of *The CoCo Calligrapher* was introduced by Sugar Software, along with seven new font styles, at RAINBOWfest-Irvine. Company executive Susan Davis said the development of the OS-9 version was in response to a strong market need.

The new fonts are: Western, Stars, Checkers, Victorian, Hebrew, Block and Computer. Ms. Davis added that all of the fonts now available contain four variations — standard, reduced, reverse and reverse-reduced.

Would-Be Entrepreneurs Try Hand At *Franchise*

Several would-be entrepreneurs were spotted at the Computerware exhibit, trying their luck with *Franchise*, a graphics Simulation in which you operate a fast-food chain.

The game includes financial statements to help you make management decisions about food, advertising and other necessities.

Another favorite was *Sam Sleuth*, a graphics Adventure in which you attempt to find a statue missing from the local museum.

Next RAINBOWfest At Chicago In May

Among the headliners at the next RAINBOWfest in Chicago, May 17-19, will be Rich Parry of Speech Systems who will demonstrate the new capability of speech recognition for the Color Computer. That's right — a system that allows you to enter vocal commands!

Other special guests will include Dale L. Puckett, coauthor of *The Complete Rainbow Guide To OS-9*. Dale will be autographing copies of this newest book from The Rainbow Bookshelf, plus heading two seminars on BASIC09 and on OS-9.

There will be many other CoCo experts on hand, as well as exhibits packed with brand new programs and old favorites, and, of course, the ever-popular CoCo Community Breakfast with an exciting keynote speaker.

The event, the third annual gathering in Chicago, will be held at the Hyatt Regency Woodfield, located across the street from the Woodfield Mall, one of the largest indoor shopping centers in the world. Reduced room rates at the Hyatt Regency and discounted air fares through United Air Lines are available. (See the RAINBOWfest ad on pages 113-115.)

Lee Earle (right), a professional magician, brought along Rocky Raccoon, a hand puppet to entertain attendees at the request of Tom Mix (left).

Rocky Raccoon Adds To Festive Atmosphere

Rocky Raccoon stole the affection of many RAINBOWfest attendees, eating out of their hands, rolling over and playing dead, and disappearing when you least expect it.

Actually, Rocky is a furry hand-puppet and the traveling companion of Lee Earle, a professional entertainer who also writes programs for Tom Mix Software, such as *SR-71* and *Buzzworm*. Earl added to the festive atmosphere of the CoCo Community show with his impromptu magic feats.

Earl owns two CoCos (equipped with 64K and 128K), five disk drives, two printers and several modems and recorders. "I'm in love with my Color Computers. I do all of my books on them and all of my promotions and mailings."

Distributor Gives Processor High Marks

A single board computer using a 68008 processor that will fit inside a floppy drive was demonstrated by Joe Turner of Computer Systems Center.

"It is marketed by Helix in St. Louis and sells for less than $1,000," said Turner. "It contains four serial ports, up to 512K, floppy and hard disk controller interfaces and canned software, including the OS-9 system."

DEFT Lowers Prices On Pascal Utilities

A 50 percent increase in sales for its RAINBOWfest exhibit was reported by DEFT Systems, which used the Irvine show to testmarket new and reduced prices on its PASCAL utilities.

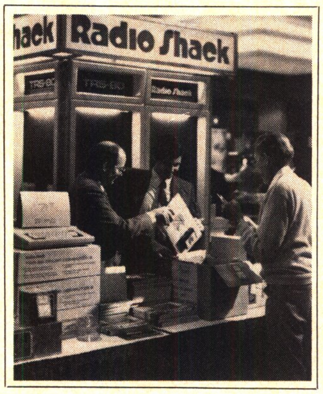
"The test was so successful that we've made the lower prices permanent," said Vice President Frank Thompson.

The *DEFT Workbench* was reduced from $119.95 to $89.95, *DEFT PASCAL* from $59.95 to $49.95, and *DEFT Bench* from $49.95 to $39.95.

300 Pose For Photos On *DS-69 Digisector*

More than 300 people posed for portraits at The Micro Works exhibit where the company was demonstrating its *DS-69 Digisector* and *C-SEE* software. The images were captured by a black-and-white television camera and printed as show souvenirs on a Hewlitt-Packard laser jet printer.

"I think people were really impressed by the speed and quality of reproduction," said Linda Vincent, marketing director. "We sold approximately 80 *DS-69* packages during the show, so we were happy, too."



Making a real hit during the show were special discounts on Color Computers at the Radio Shack exhibit. At one point, the company was selling ROM packs for one dollar each.

Cer-Comp Compiler Converts BASIC To Machine Language

New from Cer-Comp was *The CBASIC Compiler*, a program that converts BASIC programs into machine language versions, without using an assembler.

Simon Makes It Simple To Enter Commands

Attendees kept Dennis Derringer of Derringer Software busy demonstrating *Simon*, a new disk utility that keeps track of keystrokes for any BASIC file.

"It works extremely well with a program like *Pro-Color-File* where you must constantly respond to prompts," said Derringer. "With *Simon*, you need push only one key and those steps are executed automatically for you."

CHESSD Is A Challenge For Serious Strategists

Some serious strategy was called for in *CHESSD*, a high resolution game demonstrated by Computer Systems Distributers. The game accepts algebraic notations and includes a tournament timer and variable skill levels.

Many challengers declared that it was the best version they had seen on a home computer.

PRINTER UTILITY

16K
ECB

Putting The Okidata ML92 To Work

By Joseph Kohn

With the ML92, Okidata has produced a versatile, low cost printer that couples high throughput data processing, high resolution dot graphics and high dot-density, correspondence quality printing. Adding the optional high speed RS-232C board to the ML92 provides a simple interface to the Color Computer.

To accomplish the interconnections, only three wires are required from a 4-pin, male DIN connector to a male DB25 connector. These are:

DIN End	DB25 End	Function
Pin 4	Pin 3	CoCo data out
Pin 2	Pin 11	CoCo data in
Pin 3	Pin 1,7	Ground

In addition, at the DB25 connector, wire pin 4 to pin 5 and wire pin 6 to pin 20.

There are several internal DIP switches and jumpers in the ML92 that must be set. These are:

Serial Board

SW1	Not used
SW2	On
SW3,4	Off
SW5,6	On
SW7	Off
SW8	On
SW9,10	Off
SW11	On
SW12,13	Off
SW14,15	Off
SW16	Not used

Jumpers SP1 and SP2 to 'A'

Operation Panel Board

SW1,2,3,4,5	Off
SW6,7,8	On

It should be noted that the above setting of SW6 on the serial board to "On" selects a Baud rate of 2400. The CoCo normally transmits to the printer at 600 Baud, which is approximately equivalent to 75 characters per second (cps). At that rate you would notice the printer often paused to wait for data from the computer, since the ML92 is capable of printing at speeds of up to 160 cps. With 2400 Baud, printing is essentially non-stop.

Therefore, to fully exploit the high speed of the ML92, both printer and computer should be used at 2400 Baud. This is easily done in the computer by software. `POKE150,18` sets 2400 Baud and `POKE150,87` sets 600 Baud. After turn on, the CoCo is automatically set to 600 Baud.

If you do not want to fuss with the Baud rate, then leave SW6 off. On the other hand, if you are so inclined, you can set SW6 off and solder wires across its terminals. These wires are connected to an SPST switch that can be mounted on the rear parallel port cover to provide external control of the printer Baud rate. Remember that changing any switch on the printer has an effect only if done prior to turning on the printer.

Now that the hardware is all set, one can start to enjoy the capabilities of the ML92. Most of the control codes and their functions are well-explained in the manual, especially since examples are provided in BASIC. The repertoire of fonts is quite complete and the quality of the correspondence mode is impressive!

One of the first features you will want to use is the left margin control, ESC-'%Cnnn'. If you like to keep listings in a notebook, then the proper margin width can be set by using `CHR$(27)"%C096"`. This sets the left margin at $^{96}/_{120}$ of an inch, which is eight characters at 10-pitch.

At first glance, it would appear that the left margin function and the print position function ESC-'%Bnnnn'

(Joseph Kohn is a systems engineer for Goodyear Aerospace in Akron, Ohio. He is interested in graphics and utilities.)

are redundant. Such is not the case. The principal difference is that the left margin is used once per line, whereas the print position can be used as many times as necessary.

To fully understand this function, let's consider some examples. To avoid errors, Listing 1 contains all BASIC programs for this article. It may be a good idea to cycle the printer off and on before running each example.

Enter Example 1. This program says to print '1' at dot column 500, '2' at dot column 400 and '3' at dot column 600. Run the example. Did you think the printhead would fly back and forth in sequence to print the numbers? I did! But the printer is too smart; the short line logic sorted the print commands for maximum efficiency. This technique can be extended to simplify plotting of multiple functions.

Plotting? Yes, although not having complete horizontal and vertical freedom, useful plotting can be obtained using the print position control and variable line spacing. To start with, plotting is easiest going lengthwise down the paper with each line representing the independent variable, for example, 'X.' The next step is to print the dependent variable, for example, 'Y,' scaled to be compatible with the dot column spacing ($^{1}/_{120}$ of an inch). This second step is accomplished by putting the scaled 'Y' value in a four-digit string, the "nnnn" used in the print position control `CHR$(27)"%Bnnnn"`.

Enter Example 2 and `RUN`. You should have a nice sine wave representing Y=sin(3.1428*X). The program first calculates the 'Y' value, then scales it to fit in the printer's dot columns. This value is then converted to a four-digit string. Finally, the printer prints '*' at the appropriate dot column.

Now to see the real power of this function, enter the following line:

```
235 PRINT#-2,CHR$(27)"%B"+"0"+MID$(STR$(200
+200*X),2,3);"X";
```

`RUN` Example 2. You have just plotted a linear function superimposed on a sine function. You did not have to worry about setting up the print strings in terms of which symbol or function had to come first in the line. The printer did the dirty work! Multiple plots, such as this one and biorhythms, are useful and easily implemented with the ML92.

If you are not satisfied with the resolution of these plots, improvement can be had two ways: reduce line width and use dot graphics. Normal line width is $^{1}/_{6}$ or $^{24}/_{144}$ of an inch. The ESC-'%9'-n control allows the line width to change in multiples of $^{1}/_{144}$ of an inch. From the keyboard, change the line width to $^{8}/_{144}$ by entering: `PRINT#-2,CHR$(27)"% 9"CHR$(8)`.

Rerun Example 2 and notice the compressed lines. For a brief excursion into dot graphics, enter Example 3. This is the friendly sine wave again, but this time it is plotted using a single dot produced by the top pin, or hammer, in the printhead. In additon, line width is reduced to $^{4}/_{144}$ of an inch, which is two dots. Obviously, dot graphics can be handy!

Since Oki did not retain in the ML92 the TRS-80 six-block characters that were in the ML82A, one must master dot graphics in order to print patterns. The printhead has nine vertical pins, of which the top seven are addressable. That means you can control which of the seven pins to print. The pins are enabled by binary coding corresponding to character codes `CHR$(0)` to `CHR$(127)`. This means that the eighth bit from the CoCo is not required. For those with Color BASIC 1.0, PTFX16 is not required.

The most useful application of dot graphics for the CoCo is to print the `PMODE4` screen. The easiest way to do this is to assign one printer pin per screen pixel. Therefore, 256 horizontal dots and 192 vertical dots are required. The ML92 is normally set to 10-pitch with 60 dots per inch horizontally. The physical dimensions of the printhead constrain the vertical resolution to 72 dots per inch. For correct symmetry, the printer must be set to 12-pitch using `CHR$(28)` to produce 72 dots per inch horizontally.

With one dot per pixel the `PMODE4` screen prints as 3.55 by 2.64 inches. Using two dots and three dots per pixel, print sizes of 7.11 by 5.28 and 10.67 by eight inches, respectively, are produced. The larger picture must be printed lengthwise. These three print sizes are defined as sizes 1, 2 and 3.

Listing 1 has the BASIC programs for producing each size. These assume `PMODE4` starting at Page 1 and that a black pixel will print black. This is a positive image. Since seven pins do not divide evenly into 256 and 192, it is more convenient to only use the top six pins in the printhead.

The three programs employ nested loops to examine each byte of screen memory, strobe each bit of the byte and turn on the proper pins. (For details of the process, refer to the ML82 `PMODE4` printing articles in the June and July 1983 issues of THE RAINBOW.)

The one aspect to the programs requiring some explanation is the statement: `IF P=3 THEN PRINT#-2, CHR$(3);`. The ML92 manual covers this topic briefly. The problem is that in the graphics mode `CHR$(3)` is a control code. In order to print `CHR$(3)`, you must send `CHR$(3)` twice. This program statement performs this task.

To use these programs, first run a program to generate `PMODE4` graphics. Then either BREAK or reset. Enter the screen print routines and `RUN`. You will notice that although producing the desired result, the programs run very slowly.

Using the machine language program in Listing 2 will greatly reduce the processing time. In addition, the program permits Baud rate selection, positive or negative image and placing the size 1 image left, right or center. This program was provided as a utility rather than as a tutorial and contains little notation. The flow is the same as the BASIC programs. The routines for sizes 1 and 2 are combined.

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The ML code requires 616 bytes and is position independent. As shown, the starting address is $3000, but can be placed anywhere above the end of graphics Page 4 ($1DFF). The last instruction is RTS which allows it to be called as a subroutine by ML or BASIC programs.

I hope this information proves useful and you enjoy your ML92 as much as I do.

Listing 1: *DEMO*

```
310 .......80
570 ......190
END ......72
```

```
100 'LISTING 1
110 '
120 'BASIC PROGRAMS FOR ML92
130 '
140 'EXAMPLE 1
150 '*********
160 PRINT#-2,CHR$(27)"%B0500""1"
;CHR$(27)"%B0400""2";CHR$(27)"%B
0600""3"
170 END
180 '
190 'EXAMPLE 2
200 '*********
210 'SINEWAVE
220 FORX=0TO2 STEP .05
230 Y=SIN(3.1428*X):Y1=INT(500+3
00*Y):Y1$=MID$(STR$(Y1),2):Y$=RI
GHT$("000"+Y1$,4)
240 PRINT#-2,CHR$(27)"%B"+"0"+MI
D$(STR$(200+200*X),2,3);"X";
250 PRINT#-2,CHR$(27)"%B"Y$"*"
260 NEXT
270 END
280 '
290 'EXAMPLE 3
300 '*********
310 PRINT#-2,CHR$(27)"%9"CHR$(4)
320 FORX=0TO2 STEP .02
330 Y=SIN(3.1428*X):Y1=INT(500+3
00*Y):Y1$=MID$(STR$(Y1),2):Y$=RI
GHT$("000"+Y1$,4)
340 PRINT#-2,CHR$(27)"%B"Y$;CHR$
(3)CHR$(1);CHR$(3)CHR$(10)CHR$(3
)CHR$(2);
350 NEXT
360 END
370 '
380 'SIZE 1 PRINT
390 '************
400 PRINT#-2,CHR$(28)CHR$(27)"%9
"CHR$(12)CHR$(3);
410 FOR V=1536 TO 7648 STEP 192
```

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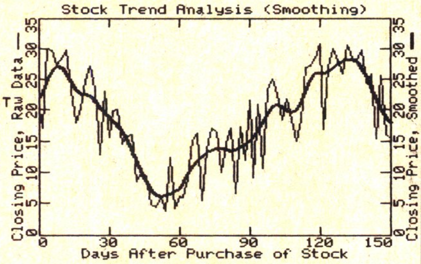

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```
420 FORW=0 TO 31
430 XX=128:FORX=0 TO 7
440 P=0:YY=1:FORY=0 TO 160 STEP3
2
450 IF (255-PEEK(V+W+Y)) AND XX
THEN P=P+YY
460 YY=YY*2:NEXTY
470 PRINT#-2,CHR$(P);:IF P=3 THE
N PRINT#-2,CHR$(3);
480 XX=XX/2:NEXT X,W
490 PRINT#-2,CHR$(3)CHR$(10);
500 NEXT V
510 PRINT#-2,CHR$(3)CHR$(2)
520 END
530 '
540 'SIZE 2 PRINT
550 '*************
560 PRINT#-2,CHR$(28)CHR$(27)"%9
"CHR$(12)CHR$(3);
570 FORV=1536 TO 7584 STEP 96
580 FOR W=0 TO 31
590 XX=128:FOR X=0 TO 7
600 P=0:YY=3:FORY=0TO64 STEP 32
610 IF (255-PEEK(V+W+X)) AND XX
THEN P=P+YY
620 YY=YY*4:NEXT Y:FOR Q=1 TO 2
630 PRINT#-2,CHR$(P);:IF P=3 THE
N PRINT#-2,CHR$(3);
640 NEXT Q:XX=XX/2:NEXT X,W
650 PRINT#-2,CHR$(3)CHR$(10);
660 NEXTV
670 PRINT#-2,CHR$(3)CHR$(2)
680 END
690 '
700 'SIZE 3 PRINT
710 '************
720 PRINT#-2,CHR$(28)CHR$(27)"%9
"CHR$(12)CHR$(3);
730 FORV=7648 TO 7679
740 XX=128:FORX=0TO3
750 FORW=0TO6112 STEP 32
760 X1=XX:P=0:YY=7:FORY=0TO1
770 IF (255-PEEK(V-W)) AND X1 TH
EN P=P+YY
780 YY=56:X1=X1/2:NEXTY
790 FOR Q=1TO3
800 PRINT#-2,CHR$(P);:IFP=3 THEN
 PRINT#-2,CHR$(3);
810 NEXTQ
820 NEXTW:PRINT#-2,CHR$(3)CHR$(1
0);
830 XX=XX/4:NEXTX,V
840 PRINT#-2,CHR$(3)CHR$(2)
850 END
```

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Listing 2: *MODE4PRT*

```
                00100 ***************
                00110 *PMODE4 PRINT*
                00120 ***************
                00130 *
                00140 *FOR ML92 PRINTER
                00150 *DISK/CASSETTE COMPATIBLE
                00160 *18JAN84
                00170 *
                00180 *ROM ROUTINES
          A928  00190 CLRSCR  EQU $A928
          A30A  00200 SCRPRT  EQU $A30A
          A2BF  00210 PRTPRT  EQU $A2BF
          A1B1  00220 GETKEY  EQU $A1B1
                00230 *
                00240 *USER STACK
          0001  00250 PAGBYT  EQU 1
          0003  00260 LINBYT  EQU 3
          0004  00270 PAGOFF  EQU 4
          0005  00280 PIXSTR  EQU 5
          0006  00290 HAMVAL  EQU 6
          0007  00300 REPPRT  EQU 7
          0008  00310 STEP    EQU 8
          0009  00320 PAGEND  EQU 9
          000A  00330 HAMSTP  EQU 10
          000B  00340 HAMST   EQU 11
          000C  00350 ENDBYT  EQU 12
                00360 *INITIALIZE
3000            00370         ORG $3000
3000 34   77    00380 START   PSHS X,Y,D,CC,U
3002 32   71    00390         LEAS -15,S
3004 1F   43    00400         TFR S,U
                00410 *
                00420 *PROMPT FOR BAUD
3006 BD   A928  00430 CCC     JSR CLRSCR
3009 30   8C 16 00440         LEAX <TITLE,PCR
300C 17   024E  00450         LBSR DISPLA
300F BD   A1B1  00460 RATE    JSR GETKEY
3012 27   FB    00470         BEQ RATE
3014 81   31    00480         CMPA #'1
3016 27   38    00490         BEQ SLOW
3018 81   32    00500         CMPA #'2
301A 27   38    00510         BEQ FAST
301C 81   33    00512         CMPA #'3
301E 27   38    00514         BEQ SUPER
3020 20   E4    00520         BRA CCC
3022      2A    00530 TITLE   FCC /*PMODE4 PRINT 2.2*/
3034      0D0D  00540         FDB $0D0D
3036      42    00550         FCC /BAUD? 1=600 2=2400 3=9600/
304F      00    00560         FCB 0
                00565 *
3050 C6   57    00570 SLOW    LDB #87
3052 20   06    00580         BRA BAUD
3054 C6   12    00590 FAST    LDB #18
3056 20   02    00592         BRA BAUD
3058 C6   01    00594 SUPER   LDB #1
305A D7   96    00600 BAUD    STB 150
                00610 *
                00620 *PROMPT FOR NEG/POS
305C BD   A928  00630 POSNEG  JSR CLRSCR
305F 30   8C 12 00640         LEAX <PNPROM,PCR
3062 17   01F8  00650         LBSR DISPLA
3065 BD   A1B1  00660 ZZZ     JSR GETKEY
3068 27   FB    00670         BEQ ZZZ
306A 81   50    00680         CMPA #'P
306C 27   1F    00690         BEQ POS
306E 81   4E    00700         CMPA #'N
3070 27   17    00710         BEQ NEGAT
3072 20   E8    00720         BRA POSNEG
3074      0D    00730 PNPROM  FCB $0D
3075      70    00740         FCC /pOSITIVE,nEGATIVE? /
3088      00    00750         FCB 0
3089 C6   53    00760 NEGAT   LDB #$53
308B 20   02    00770         BRA BZ
308D C6   12    00780 POS     LDB #$12
308F E7   8D 00B4 00790 BZ    STB NEG,PCR
3093 E7   8D 0158 00800       STB NEGG,PCR
                00810 *
                00820 *PROMPT FOR PIX SIZE
3097 30   8D 0198 00830       LEAX INIT,PCR
309B 17   01C9  00840         LBSR PRINT
309E BD   A928  00850 DDD     JSR CLRSCR
30A1 30   8C 1A 00860         LEAX <SIZE,PCR
30A4 17   01B6  00870         LBSR DISPLA
30A7 BD   A1B1  00880 DD      JSR GETKEY
30AA 27   FB    00890         BEQ DD
30AC 81   31    00900         CMPA #'1
30AE 27   1E    00910         BEQ ONEX
30B0 81   32    00920         CMPA #'2
30B2 1027 00DD  00930         LBEQ TWOX
```

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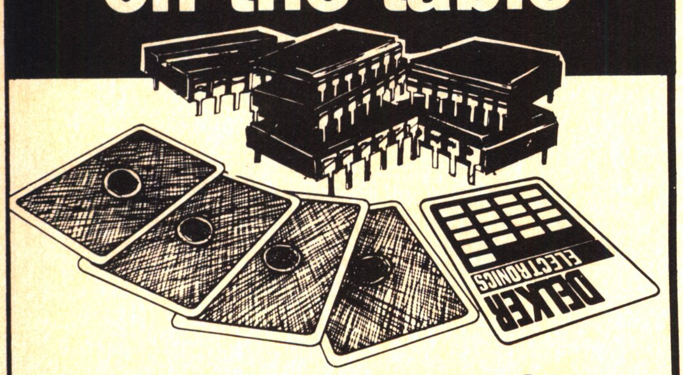

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30B6 81   33       00940         CMPA #'3
30B8 1027 00FF     00950         LBEQ THREEX
30BC 20   E0       00960         BRA DDD
30BE      0D       00970 SIZE    FCB $0D
30BF      53       00980         FCC /SIZE (1,2,3)? /
30CD      00       00990         FCB 0
                   01000 *
                   01010 *PRINT 1X PICTURE
30CE BD   A928     01020 ONEX    JSR CLRSCR
30D1 30   8D 0016  01030         LEAX PLACE,PCR
30D5 17   0185     01040         LBSR DISPLA
30D8 BD   A1B1     01050 EE      JSR GETKEY
30DB 27   FB       01060         BEQ EE
30DD 81   4C       01070         CMPA #'L
30DF 27   1F       01080         BEQ LL
30E1 81   52       01090         CMPA #'R
30E3 27   21       01100         BEQ RR
30E5 81   43       01110         CMPA #'C
30E7 27   23       01120         BEQ CCCC
30E9 20   E3       01130         BRA ONEX
30EB      0D       01140 PLACE   FCB $0D
30EC      6C       01150         FCC /lEFT,rIGHT,cENTER? /
30FF      00       01160         FCB 0
3100 30   8D 0138  01170 LL      LEAX MARG1L,PCR
3104 20   0A       01180         BRA START1
3106 30   8D 0137  01190 RR      LEAX MARG1R,PCR
310A 20   04       01200         BRA START1
310C 30   8D 0136  01210 CCCC    LEAX MARG1C,PCR
3110 17   0154     01220 START1  LBSR PRINT
3113 BD   A928     01230         JSR CLRSCR
3116 C6   01       01240         LDB #1
3118 E7   47       01250         STB REPPRT,U
311A E7   4B       01260         STB HAMST,U
311C E7   4A       01270         STB HAMSTP,U
311E 9E   BA       01280         LDX $BA
3120 AF   41       01282         STX PAGBYT,U
3122 30   89 17E0  01284         LEAX 6112,X
3126 AF   4C       01290         STX ENDBYT,U
3128 C6   C0       01300         LDB #192
312A E7   48       01310         STB STEP,U
312C C6   A0       01320         LDB #160
312E E7   49       01330         STB PAGEND,U
3130 6F   43       01360 LLL     CLR LINBYT,U
3132 C6   80       01370 KK      LDB #128
3134 E7   45       01380         STB PIXSTR,U
3136 E6   4B       01390 JJ      LDB HAMST,U
3138 E7   46       01400         STB HAMVAL,U
313A 4F            01410         CLRA
313B 6F   44       01420         CLR PAGOFF,U
313D AE   41       01430 GG      LDX PAGBYT,U
313F E6   43       01440         LDB LINBYT,U
3141 3A            01450         ABX
3142 E6   44       01460         LDB PAGOFF,U
3144 3A            01470         ABX
3145 E6   84       01480         LDB ,X
3147               01490 NEG     RMB 1
3148 E5   45       01500         BITB PIXSTR,U
314A 26   02       01510         BNE FF
314C AB   46       01520         ADDA HAMVAL,U
314E 5F            01530 FF      CLRB
314F 68   46       01540 FFF     LSL HAMVAL,U
3151 5C            01550         INCB
3152 E1   4A       01560         CMPB HAMSTP,U
3154 25   F9       01570         BLO FFF
3156 E6   44       01580         LDB PAGOFF,U
3158 34   04       01590         PSHS L
315A C6   20       01600         LDB #32
315C EB   E0       01610         ADDB ,S+
315E E7   44       01620         STB PAGOFF,U
3160 E1   49       01630         CMPB PAGEND,U
3162 23   D9       01640         BLS GG
3164 17   010A     01650         LBSR OUTCHR
3167 E6   45       01660         LDB PIXSTR,U
3169 C1   01       01670         CMPB #1
316B 27   04       01680         BEQ II
316D 64   45       01690         LSR PIXSTR,U
316F 20   C5       01700         BRA JJ
3171 6C   43       01710 II      INC LINBYT,U
3173 E6   43       01720         LDB LINBYT,U
3175 C1   1F       01730         CMPB #31
3177 23   B9       01740         BLS KK
3179 17   0106     01750         LBSR CR
317C AE   41       01760         LDX PAGBYT,U
317E E6   48       01770         LDB STEP,U
3180 3A            01780         ABX
3181 AF   41       01790         STX PAGBYT,U
3183 AC   4C       01800         CMPX ENDBYT,U
3185 23   A9       01810         BLS LLL
3187 30   8D 00CD  01820 FINISH  LEAX FINPRT,PCR
318B 17   00D9     01830         LBSR PRINT
318E 32   4F       01840         LEAS 15,U
3190 35   77       01850         PULS X,Y,CC,U,D
3192 39            01860         RTS
                   01870 *
3193 30   8D 00B4  01880 TWOX    LEAX MARG2,PCR
```

```
3197 17     00CD      01890           LBSR PRINT
319A BD     A928      01900           JSR CLRSCR
319D C6     02        01910           LDB #2
319F E7     47        01920           STB REPPRT,U
31A1 E7     4A        01930           STB HAMSTP,U
31A3 5C               01940           INCB
31A4 E7     4B        01950           STB HAMST,U
31A6 9E     BA        01960           LDX $BA
31A8 AF     41        01962           STX PAGBYT,U
31AA 30     89 17A0   01964           LEAX 6048,X
31AE AF     4C        01970           STX ENDBYT,U
31B0 C6     60        01980           LDB #96
31B2 E7     48        01990           STB STEP,U
31B4 C6     40        02000           LDB #64
31B6 E7     49        02010           STB PAGEND,U
31B8 16     FF75      02020           LBRA LLL
                      02030 *
31BB 30     8D 0091   02040 THREEX    LEAX MARG3,PCR
31BF 17     00A5      02050           LBSR PRINT
31C2 BD     A928      02060           JSR CLRSCR
31C5 C6     03        02070           LDB #3
31C7 E7     47        02080           STB REPPRT,U
31C9 9E     BA        02090           LDX $BA
31CB 30     89 17E0   02092           LEAX 6112,X
31CF AF     41        02100           STX PAGBYT,U
31D1 C6     80        02110 ABCDEF    LDB  #128
31D3 E7     4A        02120           STB HAMSTP,U
31D5 8E     0000      02130 ABCDE     LDX #0
31D8 AF     4C        02140           STX ENDBYT,U
31DA E6     4A        02150 ABCD      LDB HAMSTP,U
31DC E7     45        02160           STB PIXSTR,U
31DE C6     07        02170           LDB #7
31E0 E7     46        02180           STB HAMVAL,U
31E2 4F               02190           CLRA
31E3 34     02        02200 ABC       PSHS A
31E5 EC     41        02210           LDD PAGBYT,U
31E7 A3     4C        02220           SUBD ENDBYT,U
31E9 1F     02        02230           TFR D,Y
31EB 35     02        02240           PULS A
31ED E6     A4        02250           LDB ,Y
31EF                  02260 NEGG      RMB 1
31F0 E5     45        02270           BITB PIXSTR,U
31F2 26     02        02280           BNE NG
31F4 AB     46        02290           ADDA HAMVAL,U
31F6 68     46        02300 NG        LSL HAMVAL,U
31F8 68     46        02310           LSL HAMVAL,U
31FA 68     46        02320           LSL HAMVAL,U
31FC 64     45        02330           LSR PIXSTR,U
31FE E6     46        02340           LDB HAMVAL,U
3200 C1     38        02350           CMPB #56
3202 27     DF        02360           BEQ ABC
3204 17     006A      02370           LBSR OUTCHR
3207 AE     4C        02380           LDX ENDBYT;U
3209 30     88 20     02390           LEAX 32,X
320C AF     4C        02400           STX ENDBYT,U
320E 8C     17E0      02410           CMPX #6112
3211 23     C7        02420           BLS ABCD
3213 17     006C      02430           LBSR CR
3216 64     4A        02440           LSR HAMSTP,U
3218 64     4A        02450           LSR HAMSTP,U
321A E6     4A        02460           LDB HAMSTP,U
321C C1     02        02470           CMPB #2
321E 24     B5        02480           BHS ABCDE
3220 AE     41        02490           LDX PAGBYT,U
3222 30     01        02500           LEAX 1,X
3224 AF     41        02510           STX PAGBYT,U
3226 9E     BA        02520           LDX $BA
3228 30     89 17FF   02522           LEAX 6143,X
322C AC     41        02524           CMPX PAGBYT,U
322E 24     A1        02530           BHS ABCDEF
3230 16     FF54      02540           LBRA FINISH
                      02550 *
                      02560 *ASCII STRINGS
3233        1C        02570 INIT      FCB 28
3234        1B        02580           FCB 27
3235        25        02590           FCC /%9/
            39
3237        0C        02600           FCB 12
3238        1B        02610           FCB 27
3239        25        02620           FCC /%C/
323B        00        02630           FCB 0
323C        30        02640 MARG1L    FCC /036/
323F        0300      02650           FDB $0300
3241        34        02660 MARG1R    FCC /496/
3244        0300      02670           FDB $0300
3246        32        02680 MARG1C    FCC /266/
3249        0300      02690           FDB $0300
324B        30        02700 MARG2     FCC /052/
324E        0300      02710           FDB $0300
3250        30        02720 MARG3     FCC /001/
3253        0300      02730           FDB $0300
3255        030A      02740 ENDLIN    FDB $030A
3257        00        02750           FCB 0
3258        0302      02760 FINPRT    FDB $0302
325A        180D      02770           FDB $180D
325C        00        02780           FCB 0
                      02790 *
                      02800 *
                      02810 *
                      02820 *SUBROUTINES
325D A6     80        02830 DISPLA    LDA ,X+
325F 27     05        02840           BEQ AA
3261 BD     A30A      02850           JSR SCRPRT
3264 20     F7        02860           BRA DISPLA
3266 39               02870 AA        RTS
3267 A6     80        02880 PRINT     LDA ,X+
3269 27     05        02890           BEQ BB
326B BD     A2BF      02900           JSR PRTPRT
326E 20     F7        02910           BRA PRINT
3270 39               02920 BB        RTS
3271 5F               02930 OUTCHR    CLRB
3272 BD     A2BF      02940 OUT       JSR PRTPRT
3275 81     03        02950           CMPA #3
3277 26     03        02960           BNE HH
3279 BD     A2BF      02970           JSR PRTPRT
327C 5C               02980 HH        INCB
327D E1     47        02990           CMPB REPPRT,U
327F 25     F1        03000           BLO OUT
3281 39               03010           RTS
3282 30     8C D0     03020 CR        LEAX ENDLIN,PCR
3285 8D     E0        03030           BSR PRINT
3287 39               03040           RTS
            0000      03050           END
00000 TOTAL ERRORS
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

See You At
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May 17-19

Computer Island Educational Software

PRESCHOOL

PROGRAM TITLE	GRADES	MEMORY	PRICE
Preschool I - counting	Pre-K	16K Ext.	11.95
Preschool II - adding	Pre-K	16K Ext.	11.95
Preschool III - alphabet	Pre-K	16K Ext.	11.95
Music Marvel-play songs	Pre-K,1	16K-Ext.	11.95
Arrow Games - 6 games	Pre-K,1	32K-Ext.	21.95
First Games - 6 games	Pre-K,1	32K-Ext.	24.95
Mr. Cocohead-facemaker	K-3	16K-Ext.	16.95
Bentley Bear	Pre-K	32K-Disk	29.95

LANGUAGE ARTS

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Beyond Words 1-3 parts	3-5	32K-Ext.	19.95
Beyond Words 2-3 parts	6-8	32K-Ext.	19.95
Beyond Words 3-3 parts	9-12	32K-Ext.	19.95
Vocabulary 1-1000 words	3-5	32K-Ext.	19.95
Vocabulary 2-1000 words	6-8	32K-Ext.	19.95
Vocabulary 3-1000 words	9-12	32K-Ext.	19.95
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King Author - writing tool	2-6	16/32 Ext.	29.95
Cocowheel of Fortune	4-up	32K-tape*	19.95

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French Baseball-200wds.	4-up	16K-Ext.	11.95
French Baseball-500wds.	4-up	32K-Ext.	19.95
Spanish Baseball-200wds	4-up	16K-Ext.	11.95
Spanish Baseball-500wds	4-up	32K-Ext.	19.95
Italian Baseball-200wds.	4-up	16K-Ext.	11.95
Hebrew Alphabet	beginners	16K-Ext.	11.95
Hebrew Utility	drawing utility	16K-Ext.	15.95

CRITICAL THINKING PROBLEMS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Factory by Sunburst	4-up	32K-disk	39.95
Pond by Sunburst	2-up	32K-disk	39.95
Teasers by Tobbs-Sunb.	4-up	32K-disk	39.95
Inner City - simulation	7-up	32K-disk	49.95
Find The Math Sequence	4-up	32K-Ext.	19.95
Stranded-graphic advent.	4-up	32K-disk	24.95

TEACHER/STUDENT AIDS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Colorgrade - gradebook	Adult	32K-disk	29.95
Quizmaker - write quizzes	5-up	32K-Ext.	24.95
ETT typing tutor (CocoWarehouse)	4-up	16K-Ext.	21.95
The Puzzler (ColorConnection)	4-up	32K-disk	23.95

MATH

PROGRAM TITLE	GRADES	MEMORY	PRICE
Dollars & Sense	2-4	16K-Ext.	14.95
McCoco's Menu	3-5	16K-Ext.	14.95
Moneypak	2-5	32K-Ext.	24.95
Graph Tutor	3-7	32K-Ext.	19.95
Graph-It	7-up	16K-Ext.	14.95
Math Invaders	1-8	16K-Ext.	17.95
Mathquiz - 4 operations	2-5	32K-Ext.	19.95
Addition & Subtraction	2-3	16K	11.95
Crocodile Math - joystick	2-5	16 tape*	17.95
Skill Tutor Series			
Division Tutor	3-7	16K-Ext.	14.95
Multiplication Tutor	3-7	16K-Ext.	14.95
Factors Tutor	5-8	16K-Ext.	19.95
Fractions Tutors (3 programs) addition, subtraction or multiplication	4-8	16K-Ext.	19.95ea
Trigonometry	8-10	32K-Ext.	24.95
Equations Linear	7-9	32K-Ext.	19.95
Equations Quadratic	8-11	32K.Ext.	19.95
Arith. Diagnostic Disk	3-8	32K-disk	49.95
Fraction Diagnostic Disk	4-9	32K-disk	49.95
Verbal Problems Series			
Distance Problems	5-8	32K-Ext.	19.95
Area & Perimeter	5-8	32K-Ext.	19.95
Pizza Game	3-5	32K-Ext.	19.95
Sales & Bargains	6-8	32K-Ext.	19.95

SOCIAL STUDIES

PROGRAM TITLE	GRADES	MEMORY	PRICE
Know Your States	5-up	32K-Ext.	19.95
History Game	5-up	32K-Ext.	14.95
States & Capitals	5-up	32K-Ext.	19.95
Explorers & Settlers	4-up	32K-Ext.	19.95
Famous American Women	6-up	32K-Ext.	19.95
Street Map Game	3-5	32K-Ext.	19.95

MISCELLANEOUS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Name That Song 1,2,or 3	2-up	16K-Ext.	11.95
Circus Adventure	1-3	16K	11.95
Schoolmaze Adventure	1-4	16K	11.95
Treasure Hunt - joystick	1-5	16K-tape*	19.95
Picnic - 2 arcade games	3-up	16K-Ext.	11.95
Music Drill	3-up	16K-Ext.	19.95
Science Game	8-up	32K-disk	29.95
Computer Literacy	6-up	32K-Ext.	19.95
5 Educational Programs with Lightpen	1-2	32K-disk	44.95

Computer Island

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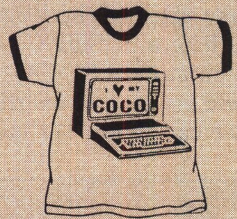

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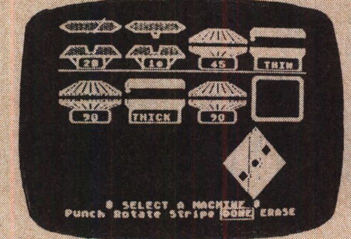

The Factory: FROM SUNBURST
Strategies in Problem Solving

Grades 4-adult. Winner 1983 Learning Software Award. Recommended in Classroom Computer Learning, Courseware Report Card and Electronic Learning Unique three-level program challenges students to create geometric "products" on a simulated machine assembly line which the student designs. Diskette for 32K TRS-80 Color Computer with Extended Color BASIC. $39.95

The Pond: FROM SUNBURST
Strategies in Problem Solving

Grades 2-adult. Winner 1983 Learning Software Award. Recommended in Classroom Computer Learing. A small green frog, lost in a pond of lily pads, helps students recognize and articulate patterns, generalize from raw data and think logically. Diskette for 32K TRS-80 Color Computer with Extended Color BASIC. $39.95

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A fully graphic adventure in which you are an astronaut stranded on the moon. Your space ship cannot be repaired and you must get back to earth. Inventory displayed on screen at all times. Save and reload at any time. Map included, if you wish to use it. An entertaining way to improve critical thinking.

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Let's Create A Spreadsheet

By Richard A. White
Rainbow Contributing Editor

I will not risk boring you with a discussion of a small-business inventory spreadsheet. Rather, I am going to run through the calculation of values for a sine wave which quickly and easily leads to some spectacular results.

Any of the CoCo spreadsheets will be able to produce these results. I am using *DynaCalc* because it is able to display and print the formulae which have been entered into each cell. Furthur, it is able to provide printouts with the column lettering and row numbering borders. This makes life a lot easier in producing this column.

*Elite*Calc, DynaCalc* and *VIP Calc* can all make ASCII saves of all or a portion of a spreadsheet. In this case, most of the examples in this article were saved to disk, loaded into *Telewriter* and made a part of the column. While sections of BASIC that have appeared in my past columns also came to THE RAINBOW on disk, I had typed all that into the computer and debugged the program lines before transferring the program into *Telewriter*. Now many of the characters in the following examples are computer generated and come to you untyped by human fingers.

Our student members know, and some others may remember, that the sine is a trigonometric function. The following diagram will help us explain it.

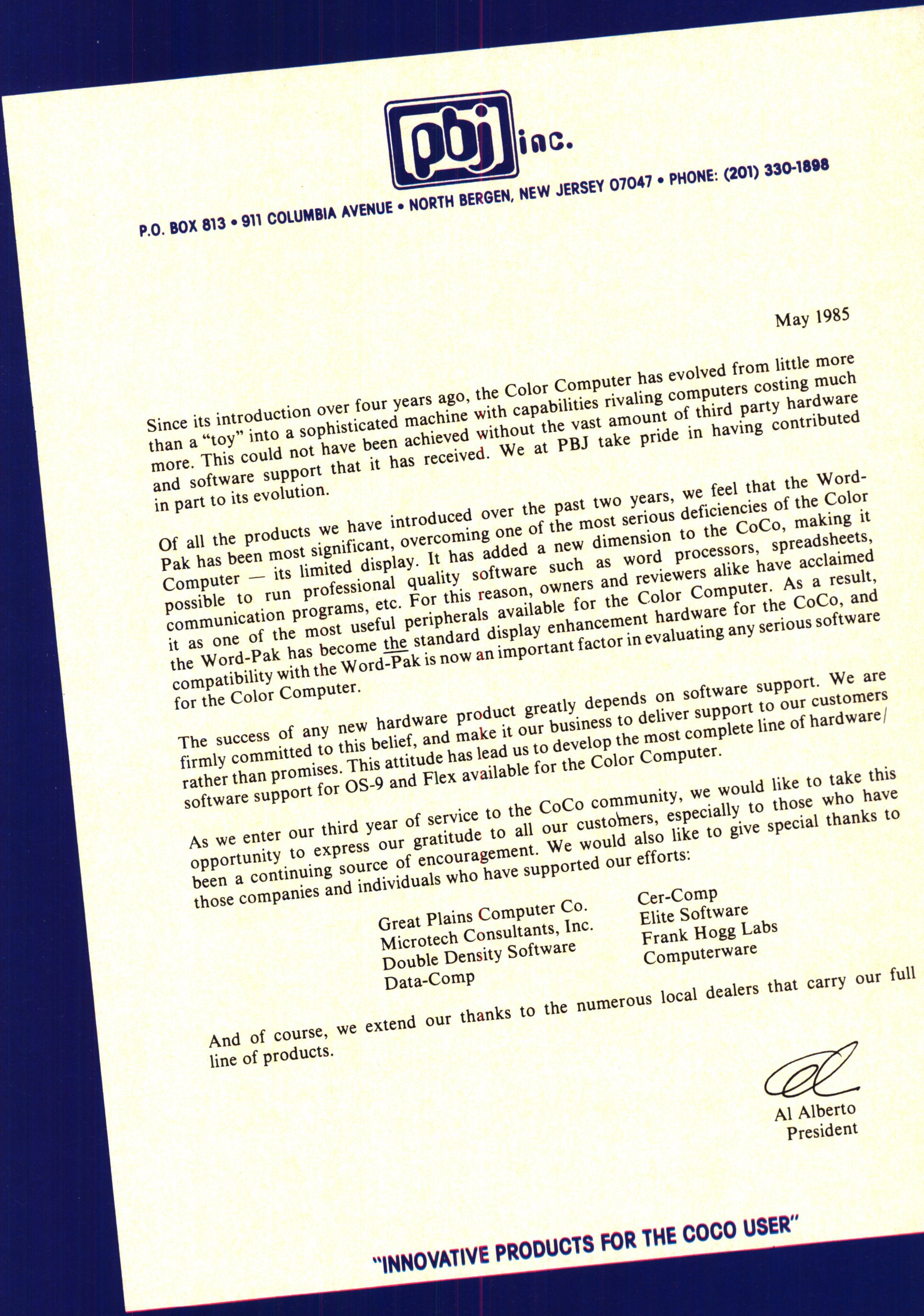
```
                                           ----1
                                        ---    1
                                     ---       1
                                  ---          1
                               ---             1
                            ---                1
                  SIDE C ---            SIDE A 1
                      ---                      1
                   ---                         1
                ---                            1
             ---                               1
          ---                                  1
       ---                                     1
    ---                                        1
 ---  ANGLE A                          ANGLE C 1
------------------------------------------------
                     SIDE B
```

This is a right triangle, so named because Angle C is a 90 degree or right angle. Side C is the long side or hypotenuse of the triangle. Now you remember why trigonometry was so tough — it was those obscure words! Maybe if Side C had been called the roof side things might have made more sense. By definition, the sine of Angle A is the ratio of the length of Side A to the length of Side C. The mathematical notation is SIN(A)=A/C.

There are some properties of the sine that we can figure out just by looking at the diagram. If Angle A=0, then the length of Side A must be zero and a/c=0. Remember that Angle C will always be 90 degrees. Then if Angle A=90 degrees, side A=Side C and SIN(A)=1.

(Richard White has a long background with microcomputers and specializes in BASIC *programming. With Don Dollberg, he is the author of the* TIMS *database management program.)*

AN OPEN LETTER TO THE CoCo COMMUNITY



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May 1985

Since its introduction over four years ago, the Color Computer has evolved from little more than a "toy" into a sophisticated machine with capabilities rivaling computers costing much more. This could not have been achieved without the vast amount of third party hardware and software support that it has received. We at PBJ take pride in having contributed in part to its evolution.

Of all the products we have introduced over the past two years, we feel that the Word-Pak has been most significant, overcoming one of the most serious deficiencies of the Color Computer — its limited display. It has added a new dimension to the CoCo, making it possible to run professional quality software such as word processors, spreadsheets, communication programs, etc. For this reason, owners and reviewers alike have acclaimed it as one of the most useful peripherals available for the Color Computer. As a result, the Word-Pak has become the standard display enhancement hardware for the CoCo, and compatibility with the Word-Pak is now an important factor in evaluating any serious software for the Color Computer.

The success of any new hardware product greatly depends on software support. We are firmly committed to this belief, and make it our business to deliver support to our customers rather than promises. This attitude has lead us to develop the most complete line of hardware/software support for OS-9 and Flex available for the Color Computer.

As we enter our third year of service to the CoCo community, we would like to take this opportunity to express our gratitude to all our customers, especially to those who have been a continuing source of encouragement. We would also like to give special thanks to those companies and individuals who have supported our efforts:

Great Plains Computer Co.
Microtech Consultants, Inc.
Double Density Software
Data-Comp
Cer-Comp
Elite Software
Frank Hogg Labs
Computerware

And of course, we extend our thanks to the numerous local dealers that carry our full line of products.

Al

Al Alberto
President

"INNOVATIVE PRODUCTS FOR THE COCO USER"

Since Side C can be rotated in a full circle, Angle A can range from zero to 360 degrees. We can use a spreadsheet to explore how the value of the SIN(A) changes as Angle A changes. Start by loading your spreadsheet.

The first order of business is to put a title at the top. Right off we have differences in how spreadsheets handle a label that is longer than a cell. In *Elite*Calc* and *Spectaculator*, the long title is stored in one cell and displayed in adjacent empty cells in a row as necessary. *DynaCalc* and *VIP Calc* store pieces of the title in adjacent cells in a row according to the width of each cell. *DynaCalc* has a label entry mode attribute that allows the user to choose if labels typed in one cell will automatically be continued across the row, being entered in following cells as necessary.

The alternative is to store the whole label in the one cell and only display characters up to the column width of the cell. We will enter the title "CALCULATE AND PLOT SINE WAVE" so it displays completely using cells A1. . .D1.

A1. . .D1 indicates the range of cells including A1, B1, C1 and D1. Understanding how cell ranges work is crucial to successful spreadsheet operation. A range may include a number of adjacent cells in a row as above, or in a column or block spanning rows and columns.

A range specification includes the first cell, generally to the upper-left, a delimiter character and the ending cell, generally to the lower-right of the range. *DynaCalc* and *VIP Calc* use the period for a delimiter and automatically expand this single character to three periods for display as above. *Elite*Calc* and *Spectaculator* use the colon for the delimiter and display a range as A1:D1.

Using ranges, you can save all or some part of a spreadsheet, print all or some part and replicate or copy contents of certain cells into others. Ranges are also used to define INDEX and LOOKUP table locations in the spreadsheet. In some spreadsheets, you can specify the range of cells over which a specific format applies.

Below is the top-left portion of a spreadsheet showing the main title plus headings for columns A and B. Since I want to start calculating sines at zero degrees, I put a zero in A3. All spreadsheets assume more entries will be values than labels or formulae, and look for the entry of a digit to start entry of a value automatically.

But, there are differences when it comes to text and formulae entry. In *Elite*Calc*, you are normally in command mode where the program is looking for either a numerical digit to start entry of a value or a letter to request a command. One such command is 'T' which puts *Elite*Calc* into text entry until you press the BREAK key to return to command mode. You can also signal text for one cell by moving the cursor to that cell and typing a quotation mark (").

> ***"Replicate is a way to copy the cell contents and adjust formulae from one or more cells into others elswhere in the spreadsheet. It's one of those big guns that make spreadsheets so useful."***

DynaCalc and *VIP Calc* accept a letter or space to signal that the entry of text (a label) is beginning. To get to command mode, type a slash (/). In all these programs, the BREAK key returns the user to the base or default mode. Knowledgeable *VIP Calc* users are probably saying "what is this slash stuff?", since *VIP*'s documentation says use the CLEAR key to get to the command mode. Use of CLEAR to get to command mode is standard across the *VIP Library* so it is natural to include it in *VIP Calc*, but the *VisiCalc* slash standard works also.

All programs need some clue that formula is coming. An equal sign (=) starts formula entry in *Elite*Calc*, while a plus sign (+) does the job in *DynaCalc* and *VIP Calc*. In the example below, I actually typed `+@SIN(A3)` and `+A3+10` to enter the formulae.

```
     [  A   ][  B   ][  C   ][  D   ][  E   ]
   1-CALCULATE AND PLOT SINE WAVE
   2-DEGREES  SINE
   3- 0       @SIN(A3)
   4- A3+10
```

There are two ways to measure an angle: degrees and radians. Many computer languages, including CoCo Extended BASIC, expect that an angle will be given in radian.

1 Radian = 360 Degrees
/(2*PI) =57.29577951

To Convert:

Degrees to Radians:
Degrees/57.29577951

Radians to Degrees:
Radians*57.29577951

Unfortunately, *VIP Calc*'s documentation gives no clue that its trig functions are looking for angles in radians. *Elite*Calc* documentation does note this and refers the reader to the Extended BASIC manual for information. In *DynaCalc*, you can choose whether to use degrees or radians with degrees as the default. That's progress!

I definitely want the values in Column A to be in degrees since degrees make more sense to most people. *VIP* and *Elite* users will have to add a conversion step in the formulae in Column B. Fortunately, it's simply @SIN(A3/57.29577951). Take a minute to digest all this before we move on to Replicate.

Replicate is a way to copy the cell contents and adjust formulae from one or more cells into others elsewhere in the spreadsheet. It's one of those big guns that make spreadsheets so useful.

In our example above, a formula in A4 increments degrees by 10. The formula in B4 gets the sine of the value in A4. We want to do exactly the same thing in succeeding rows until the value in the 'A' column equals 360 degrees. "/R" or 'R' in *Elite* gets us into the replicate function. First, we specify the range we want to replicate as A4. . .B4. The range must be within one row or one column and cannot be a block.

Next, we must specify the destination range. Since the value in A4 is 10 degrees, we will need 35 more steps of 10 degrees each to get to 360 degrees. That should put 360 degrees in cell A39. We must replicate the formulae into rows starting with cells A5 through A39, or in spreadsheet talk, A5. . .A39.

Now comes the "curve ball"! In cell A4 the formula is A3+10. There is a choice of leaving the formula referring to A3, which is called absolute addressing, or changing it for relative addressing. If relative addressing is chosen, the formula in A4 is copied so it refers to the cell above it in the spreadsheet. That is exactly what we want since the formula in A5 should refer to the calculated value in A4, that in A6 refer to A5 and so on.

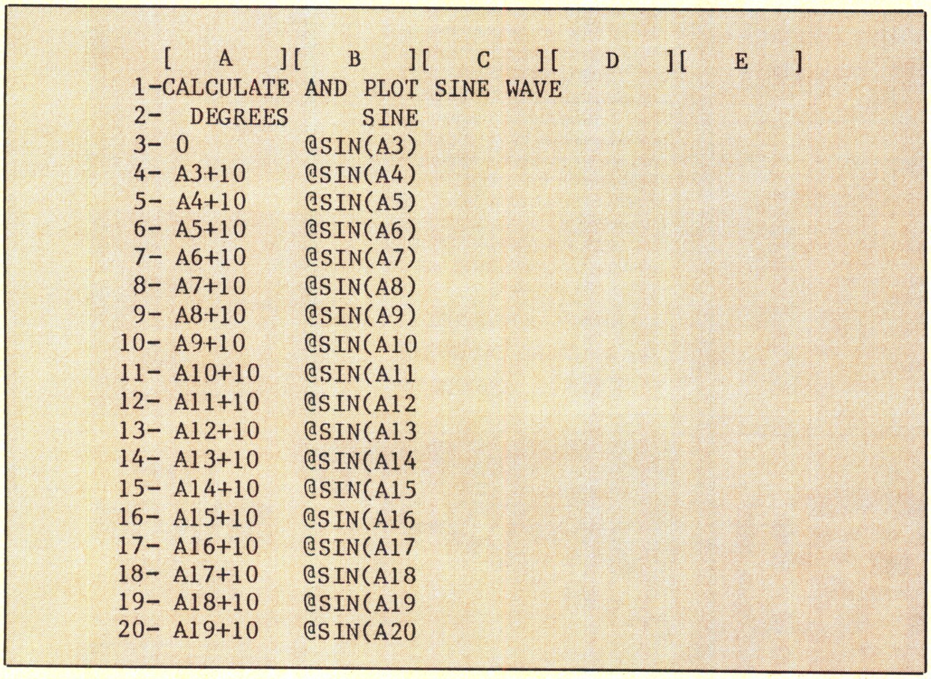
The spreadsheets will highlight or put the cursor at each cell reference in sequence in the formulae being replicated and ask you to indicate the type of addressing. In *DynaCalc*, the question is put (R)elative or (S)ame and you key 'R' or 'S' as you need. *VIP* asks Relative Y/N. *Elite*'s approach may be more confusing. First, you are presented the question OPTIONS (V,N,Q). Strike a 'V' and only the values in the cells are replicated. Key 'N' and the formulae are copied unadjusted, which is absolute addressing. Key 'Q' and you are questioned ADJUST Y/N for each cell shown in the formulae. If you despair and hit ENTER, all cell references are adjusted.

Most of the time you will use relative addressing. Absolute addressing is needed when you make a spreadsheet where there is data in specific locations that is used in a bunch of cells that are replicated from a few.

You might have a small-business inventory spreadsheet that lists items for sale, the cost of each item and then applies a fixed mark-up percentage for each item to get a sale price. That percentage could be put in a cell at the heading of the spreadsheet and referenced in each row. If new products were added, new rows would be added replicating formulae from an existing row. All cell references in the new rows, except the percentage, would be relative.

If a competitor opened up near by, it might be necessary to reduce your mark-up and selling prices to maintain your volume. Reducing the mark-up percentage in one cell and recalculating would immediately update all your selling prices.

Following are our spreadsheet formulae after replicating A4. . .B4 to A5. . .A39. Only the first 20 rows show on the screen, but the rest are in the spreadsheet.



```
   [  A  ][  B  ][  C  ][  D  ][  E  ]
 1-CALCULATE AND PLOT SINE WAVE
 2-  DEGREES      SINE
 3- 0           @SIN(A3)
 4- A3+10       @SIN(A4)
 5- A4+10       @SIN(A5)
 6- A5+10       @SIN(A6)
 7- A6+10       @SIN(A7)
 8- A7+10       @SIN(A8)
 9- A8+10       @SIN(A9)
10- A9+10       @SIN(A10
11- A10+10      @SIN(A11
12- A11+10      @SIN(A12
13- A12+10      @SIN(A13
14- A13+10      @SIN(A14
15- A14+10      @SIN(A15
16- A15+10      @SIN(A16
17- A16+10      @SIN(A17
18- A17+10      @SIN(A18
19- A18+10      @SIN(A19
20- A19+10      @SIN(A20
```

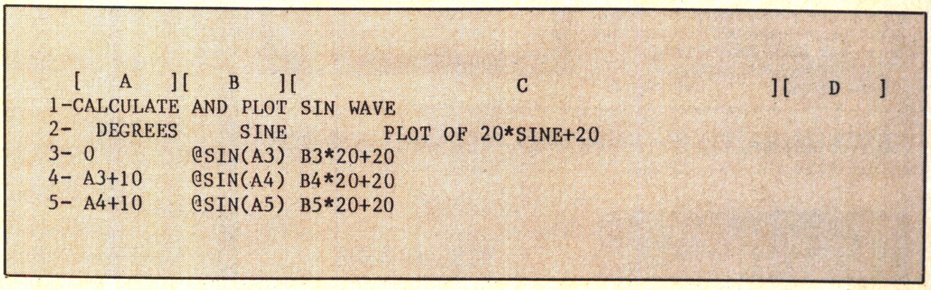
At this point, your spreadsheet would show values for the angle in Column A and values for the sine of that angle in Column B. As we expect, the sine starts at zero for zero degrees, increases to one at 90 degrees and falls back to zero at 180 degrees. You may not see zero at 180 degrees due to rounding error in the floating point calculation routines, but the number will be so small that it is, essentially, zero.

How the value of the sine changes can be plotted in a bar graph form by all the spreadsheets. We will put the bars in Column C. The standard column width of nine does not allow for much resolution in our bars.

If we increase the column width, we will be able to calculate a larger longest bar and get better resolution. I went to the *DynaCalc* Attributes menu (/A) and chose the 'W' or width option. I was then given a 'C' or 'W' choice. Since I wanted to change only Column C and not all columns that might be displayed, I keyed 'C.' I then typed 42 for the width I wanted.

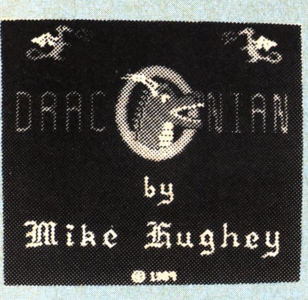
*Elite*Calc* can only display a 28-character column, so that is your limit in that program on the standard CoCo screen. However, by the time you read this, an *Elite*Calc* version that runs with *Word-Pak* on an 80-column screen will be available and wider column widths may be supported. Also note that the column width change comes under FORMAT in *Elite*, while it is a direct command (/C) in *VIP*. Choosing gets tougher and tougher as these programs continue to be improved.

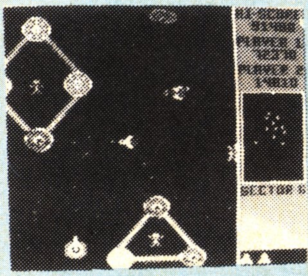
To generate a bar in a cell, we must first put a value into the cell and then format the cell to display a graphic representation of the value. In the cells in Column C, the formula multiplies the sine from Column B by 20 and then adds 20 to that value. The sine is positive from zero to 180 degrees and is then negative from 180 to 360. This means that zero will be a bar 20 characters long while no character represents a -1. The formula was then replicated over cells C4. . .C39.



```
  [  A  ][  B  ][                 C                 ][  D  ]
1-CALCULATE AND PLOT SIN WAVE
2-  DEGREES      SINE          PLOT OF 20*SINE+20
3- 0          @SIN(A3) B3*20+20
4- A3+10      @SIN(A4) B4*20+20
5- A4+10      @SIN(A5) B5*20+20
```

In *DynaCalc*, plotting comes under the format option. You have the option of formatting a single cell or setting a format that applies to all cells in the window. We want to set a format that applies to cells 3 through 39 in Column C, and neither option directly meets the need. While not as elegant as specifying a range of cells over which a format specification applies, *DynaCalc*'s Keysaver™ function does bring some automation to the task.





DRACONIAN

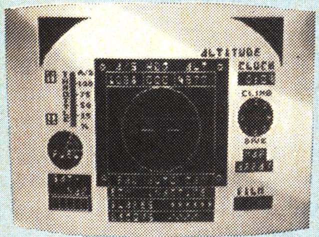
You brace yourself as your ship materializes in the enemy sector. Your engine roars to life, and you consult the long-range scanner for the position of the nearest enemy base. As you head for the base, blasting asteroids and space-mines in your path, you suddenly notice a monstrous space-dragon looming before you. Reacting quickly, you dodge his deadly fire-breath and blast him out of existence.

This is it — the single most impressive, awe-inspiring arcade game you can buy for your Color Computer. High-resolution graphics, awesome sound effects, four-voice music, and quality you have to see to believe! Experience the realism of DRACONIAN today!

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $27.95 DISK $30.95



SR-71

SR-71 is a fast action game in which you are the pilot on a mission to take photographs of missile sites in Russia and deliver them to our processing laboratory in Japan. So real you will feel as if you are in the cockpit on a real spy mission. Elude Russian missiles as well as their detection devices. Another Tom Mix exclusive. A must for the adventurous. Fantastic graphics, color and sound. **32K Ext. Basic.**

TAPE $28.95 DISK $31.95

New From Tom Mix

Worlds of Flight

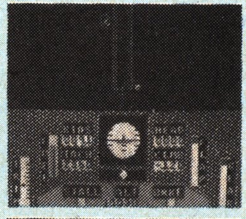
Not A Game — A Very Realistic Flight Simulation

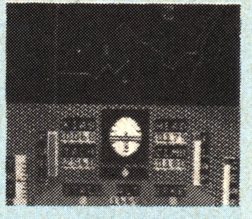
WORLDS OF FLIGHT (WOF) is a "view" oriented flight simulation for the TRS-80 Color Computer, written entirely in Machine Language. "View" oriented means that the pilot may determine his or her position by actually viewing the surrounding landmarks as opposed to using instruments which sense navigational references. This is a major departure from "instrument only" simulations which can be achieved through BASIC programs. Most instrument maneuvers and procedures may be practiced. The craft is a light-weight, single-engine airplane with low wings. A nose wheel which is both steerable and retractable is also modeled. Some aerobatics are possible including sustained inverted flight, aileron rolls, spins and stalls.

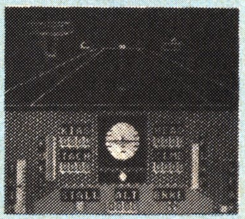
JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $29.95 DISK $32.95





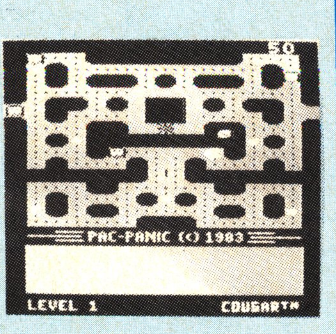


PAK-PANIC

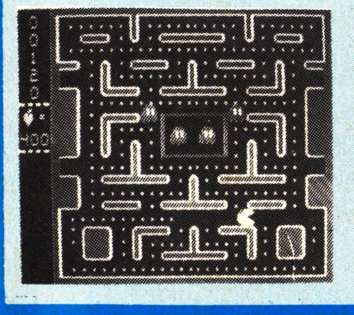
Pakman is steered thru a maze eating dots and powerpills. Pakman is pursued by four monsters who try to catch and kill him. If Pakman eats a powerpill he becomes powerful and can eat monsters. Monsters try to avoid a powerful Pakman. As monsters are eaten their ghosts appear on the top of the screen. When seven ghosts have appeared one will fly across the screen or they will link together forming a centipede that will travel thru the maze. Pakman has no power against ghosts and centipedes and must avoid them or be killed. **JOYSTICKS REQUIRED**

32K MACHINE LANGUAGE

TAPE $24.95 DISK $27.95



BOTH MS. MAZE & PAK PANIC ONLY 44.90 TAPE, 50.90 DISK



MS. MAZE

MS. MAZE is remarkable in that it combines brilliant color, high resolution, detailed graphics, and music with a very playable game. Anything that could be done to make the Color Computer look and play like the arcade version has been done. MS. MAZE is without question the closest thing to the arcade Pac games that I have seen for the Coco.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $24.95 DISK $27.95

ANNOUNCING!

The SAILOR MAN

3 Screens-Plus-"INVISO SCREEN"

The First 64K Arcade Game For the Color Computer

The first screen objective is to catch enough of Elsie's kisses (those Red Heart Shaped Things) to fill in the squares on the Sailorman's house. If you can time your punch just so, you can send the punching bag over to knock the bucket down and, with a little bit of luck, right onto **Bigfatbadguy's** head. This will give you a little (but not much) time to catch all those RHSTs.

You must avoid contact with **Bigfatbadguy** who is actively pursuing you. You must also be careful of **Olduglyseawoman** who will appear at higher difficulty levels to chuck empties at you. Either avoid the flying bottles or punch them (with the fire button) to keep from being knocked into the water.

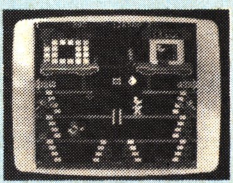
The second screen objective is to collect enough notes to play Elsie a little love song. You may jump off and onto the other end of **Fatguyeatingahamburger's** teetertotter to fly up a deck and even two decks if you manage to catch hold of **Smartaleckkid's** grab handles. Time it right and away you go.

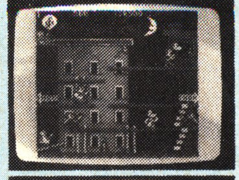
The Third screen objective is to collect enough letters (thrown by Elsie's cries for H-E-L-P) to complete a ladder all the way to the crow's nest where Elsie is calling you. Beware of the Crow, however, who thinks you are after her eggs!

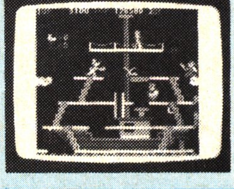
On all screens, eating a can of **collard greens** (labeled "S" for Collard and grasped by punching the can just right) will give you amazing speed, strength and agility and allow you to send **Bigfatbadguy** into the drink with a single punch.

REQUIRES 64K

DISK **$34.95** TAPE **$29.95**







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QUALITY EDUCATIONAL SOFTWARE

VOCABULARY MANAGEMENT SYSTEM

16K Extended basic/32K for printer output

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

—As many as 300 vocabulary words and definitions may be in the computer's memory at one time.

—Words and definitions may be saved on disk or tape.

—Remarks and/or comments can be saved with word files.

—A disk loading menu allows students to load disk files without typing file names.

—Word lists may be quickly alphabetized.

—The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.

TAPE $39.95 DISK $42.95

—The printer segments allow full use of your printer's special features.

—The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

FRACTIONS - A Three Program Package - 32 K EXT. BASIC TAPE $30.95 DISK $35.95

MIXED & IMPROPER

1. Review converting mixed numerals and improper fractions.
2. Practice converting mixed numerals to improper fractions.
3. Practice converting improper fractions to mixed numerals.
4. Practice of both types. (Mixed to improper & improper to mixed)
5. Review converting mixed numerals to mixed numerals. (Used in regrouping in substraction)
6. Practice converting mixed numerals to mixed numerals.

EQUIVALENCE

1. Definitions of terms and review of finding equivalent fractions.
2. Practice finding equivalent fractions.
3. Practice finding sets of equivalent fractions.
4. Review of finding if one fraction is equal to, not equal to, less than or greater than another.
5. Practice finding if one fraction is equal to, not equal to, less than or greater than another.

LOWEST TERMS

1. Review of placing fractions into lowest terms by finding the greatest common factor (GCF) of the numerator and denominator.
2. Practice finding the GCF of pairs of numbers.
3. Practice placing fractions into lowest terms by finding the GCF of the numerator and denominator.

TEACHER'S DATABASE

TEACHER'S DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive:

- Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatible.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be quickly alphabetized.
- Records may be sorted by various criteria.
- Records may be reordered (ranked) based on test scores or other data.
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
- Student test scores may be weighted.

REQUIRES 32K EXT. BASIC
TAPE $39.95 DISK $42.95

MATH DUEL

MATH DUEL is a challenging mathematics game that pits you against the computer it a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you to gather more numbers and thus more points that than the computer.

The game is deceptively simple. You select the size of the playing field that is composed of from 8 to 100 numbers. You must then choose numbers that will give you the maximum number of points and the computer the least number of points. There are only 6 rules.

1. Any number that you chose must have at least one factor still on the playing field.
2. You receive points equal to the face value of the number that you chose.
3. The computer receives points equal to the face value of all of the remaining factors of the number that you chose.
4. All of the numbers that were awarded to you or to the computer are removed from the field.
5. The game continues until there are no numbers with factors remaining.
6. At the end the computer receives points equal to the value of all of the remaining numbers.

32K EXT. BASIC TAPE $24.95 DISK $29.95

ESTIMATE

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the Color Computer. it has many features that make its use particularly attractive.

- Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- The acceptable percent error may be changed as a student's skill improves.
- A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- The (BREAK) key has been disabled so that child will not inadvertently stop the program from running. **REQUIRES 16K EXT. BASIC**

TAPE $19.95 DISK $22.95

PRE-ALGEBRA I INTEGERS

INTEGERS is a series of four programs designed to give students practice in working with addition, subtraction, multiplication, division and the comparison of integers. It has many features that make a very valuable tool for introducing and/or maintaining skills.

- Up to 4 students may use the program at the same time.
- There are 9, user modifiable, skill levels.
- Students are given two opportunities to answer a problem.
- A detailed report of student performance, including number correct on first try, number wrong, total time used and percentage score, is presented at the end of a series of problems.
- The programs will run on a 16K TRS-80 Color Computer with or without disk drive.

Four distinct problem formats are presented. The first presents problems in this format: $-12 + -9 = ?$ The second program presents a problem with missing numerals in this format: $-7 - ? = 18$. The third program presents a problem with a missing sign: $8 - ?6 = 14$. The last program asks the student to determine the relationship (=, ◄ or ►) between two statements $3 -9$ (??) $-4 -5$.

32K EXT. BASIC
TAPE $28.95 DISK $33.95

PRE-ALGEBRA II

The second **PRE-ALGEBRA PACK** is composed of two programs, EQUATION SOLVER AND EQUATION DUEL, that are designed to give students practice in using and solving equations. It has many features that make a very valuable tool for introducing and/or maintaining skills:

- In both programs students may choose the range of numerical values that will be included in the equations so that the difficulty may change as their skill increases.
- In EQUATION SOLVER the computer secretely generates a random equation, shows the numbers that it used in the equation and the answer and challenges the student to create his/her own equation that uses the same numbers and results in the same answer.
- In EQUATION DUEL the student and the computer race to see who will be the first to create an equation from the same set of random numbers.
- Both programs give detailed reports of the student's and the computer's performance in creating and solving equations including time used, score and percentage correct.

32K EXT. BASIC
TAPE $28.95 DISK $33.95

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QUIZ KIDS

Lead a child from Logo to Basic.

LOGO SHAPES—$14.95
LOGO STARS—$14.95
Both programs on one cassette—$22.50

Everybody's talking about the **QUIZ KIDS**, the two quiz programs written in Color LOGO. Prepare your child to move from LOGO to BASIC by learning to type responses to the computer's questions. Each quiz includes Study and Practice sessions, a Test, and a Reward for a passing grade. **LOGO SHAPES** uses simple shapes, such as circles and squares. **LOGO STARS** displays five constellations from the northern sky and is an exciting introduction to the stars. (Requires Color Logo)

BUT IF YOU DON'T KNOW LOGO

Send for our LOGO STARTER program...

Teachers agree: LOGO is the best way to introduce children to computers. Now, with **LOGO STARTER** you won't have to read a book or instruction manual. Just load the **LOGO STARTER** tape. Your child will draw exciting designs right from the start. You won't waste your time on a lot of tedious typing. And your child will be on the way to computer literacy. (Requires Radio Shack Color LOGO) **$13.95**

SPEED READING $17.95

Busy executives! Students! Increase reading speed dramatically. Best available speed reading program for the CoCo. Reading material appears on the TV screen at the speed you select, training you to read faster. You can even change speed while reading. Complete with 6 different text selections and a quiz for comprehension, plus a drill to improve visual span & perception.

WILD PARTY—$27.95

A naughty,sexy computer game for 2 to 6 couples. (Write us—we'll send a copy of the Review.)

"Would definitely liven up most parties."
—Rainbow Magazine

All programs on cassette tape for 16K Color Computer. Extended BASIC not required. Prices include postage (PA residents add 6%). Send check to P.O. Box 210, Jenkintown, PA 19046

B&B Software

Keysaver remembers a series of keystrokes and allows you to repeat the series up to 255 times. First, clear the Keysaver buffer with a "slash (/) BREAK" key sequence, then type your keystroke sequence. Finally, type /K and respond to the "Times?" prompt with the number of repetitions. I put the cursor in cell C3 and hit the slash and BREAK keys, then I keyed the sequence /, F, P and down-arrow. This calls command mode, the format menu, puts the plot format in cell C3 and moves the cursor to cell C4; /K now gets the "Times?" prompt where I typed 36 ENTER. *DynaCalc* then proceeded to march down the screen setting the plot format in each 'C' column cell, printing on the screen the normal prompts and cursors as it went. The desired result is shown below as it would appear on a printout, but with the cell identification borders added.

In *Elite*Calc*, you specify a range which may be anything from a single cell to a large block of cells when you enter the format function. You are then presented number, text and width formatting options. The 'G' option places a graphics format in the cell to produce the same results as above.

In *VIP Calc*, the local format option is chosen, /F and the asterisk (*) keyed to code a cell as graphic format. The manual advised that the format be replicated over the empty cell sequence desired before formulae are entered (I have not tried this).

An experienced spreadsheet user will be able to generate the above spreadsheet, calculate it, save it and print it out in less than 15 minutes. Conventional programming languages cannot begin to approach this type of programming efficiency.

Next month, we will do a few more things with our trig function spreadsheet. Sometime after *VisiCalc* came on the market, a program called *VisiPlot* appeared that made high resolution plots from *VisiCalc* files. *Lotus 1-2-3* did one better by including the plotting in the standard package, but as a separate program. *DynaCalc* upstages *Lotus* for ease of operation by providing the high resolution graphics as an option menu available from the command mode. Stay tuned and prepare to be impressed.

```
   [   A   ][   B   ][                  C                    ][   D  ]
 1-CALCULATE AND PLOT SINE WAVE
 2-  DEGREES     SINE        PLOT OF 20*SINE+20
 3-        0        0####################
 4-       10 .1736482#######################
 5-       20 .3420201###########################
 6-       30       .5##############################
 7-       40 .6427876#################################
 8-       50 .7660444###################################
 9-       60 .8660254#####################################
10-       70 .9396926#######################################
11-       80 .9848078########################################
12-       90        1########################################
13-      100 .9848078########################################
14-      110 .9396926#######################################
15-      120 .8660254#####################################
16-      130 .7660444###################################
17-      140 .6427876#################################
18-      150       .5##############################
19-      160 .3420201###########################
20-      170 .1736482#######################
21-      180 2.78e-16####################
22-      190 -.173648#################
23-      200  -.34202#############
24-      210      -.5##########
25-      220 -.642788#######
26-      230 -.766044#####
27-      240 -.866025###
28-      250 -.939693#
29-      260 -.984808
30-      270       -1
31-      280 -.984808
32-      290 -.939693#
33-      300 -.866025###
34-      310 -.766044#####
35-      320 -.642788#######
36-      330      -.5##########
37-      340  -.34202#############
38-      350 -.173648#################
39-      360 -5.6e-16####################
```

Smile and say 'cheese' . . .

Rat Maze

The player in *Rat Maze* has a "rat's eye view" of a maze while searching for the cheese. The maze is set up in a two-dimensional array. Each element of the array holds the value of a cell in the maze. The values of the cells are determined by which walls are open to neighboring cells. Each wall, starting with the left wall and going clockwise, has a value of one, two, four and eight. Thus, a cell with the left and bottom walls open would have a value of nine (see Figure 1).

The 12 by 9 maze in Rat Maze required a 14 by 11 array. The extra elements are for border cells around the outside of the maze. Border cells are identified with a value of 100. At the start of building the maze, the rest of the cells are assigned values of zero (see Figure 2).

One cell is picked at random to start and given a value of

By Benjamin W. Brunotte

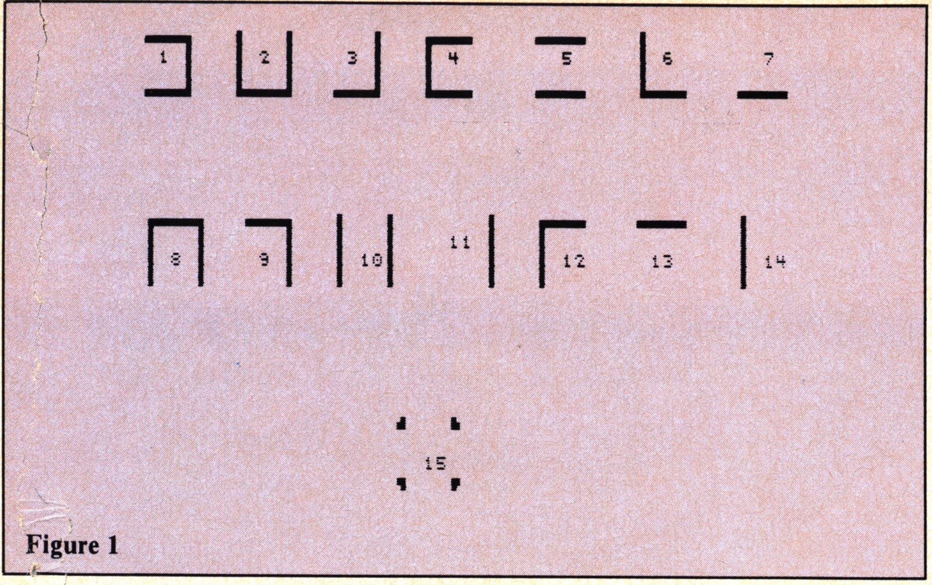
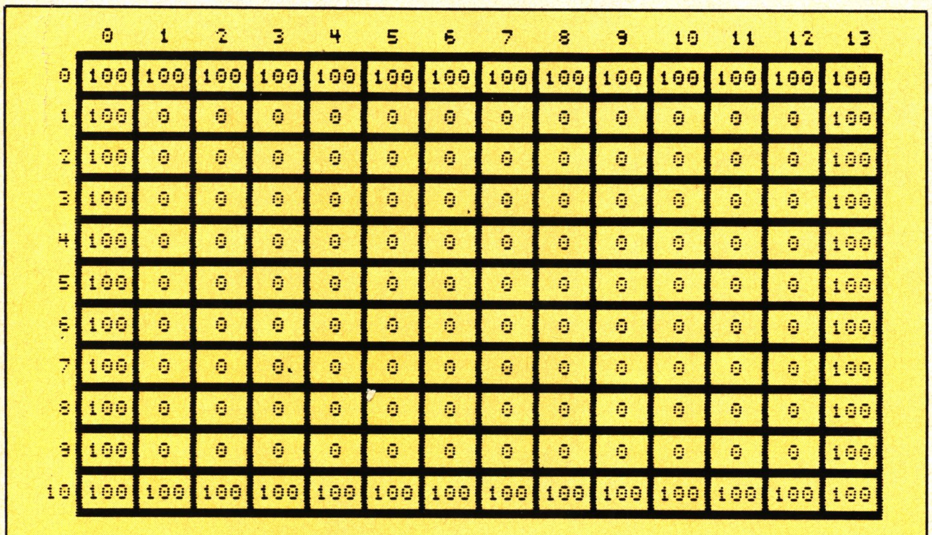
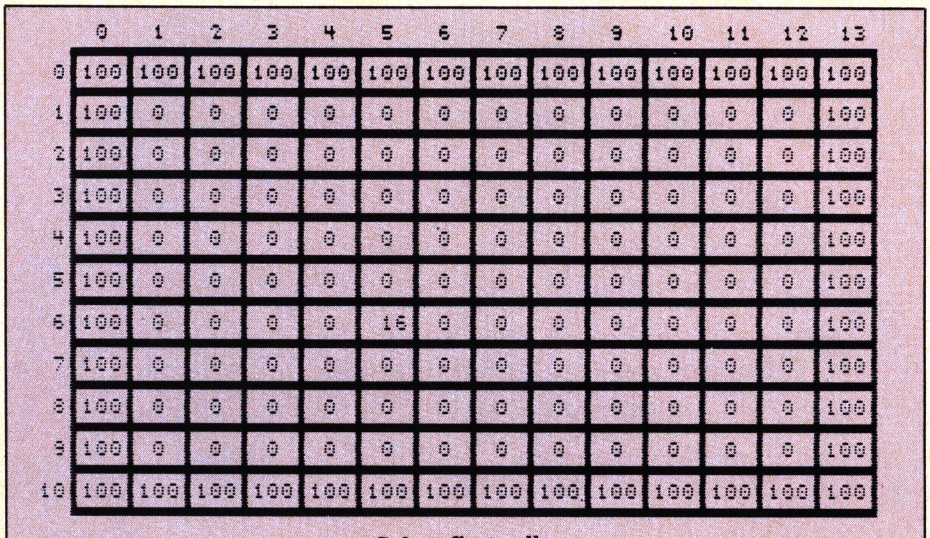


Figure 1



	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	0	0	0	0	0	0	0	0	0	100
6	100	0	0	0	0	0	0	0	0	0	0	0	0	100
7	100	0	0	0	0	0	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 2 Start



	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	0	0	0	0	0	0	0	0	0	100
6	100	0	0	0	0	16	0	0	0	0	0	0	0	100
7	100	0	0	0	0	0	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 3 Select first cell

16 (Figure 3). The four neighboring cells are then given a value of -1 to identify them as frontier cells (Figure 4). A direction is picked at random and the wall between the start cell and the frontier cell is opened. The value in the array is changed to reflect the open wall of each cell (Figure 5), then 16 is subtracted from the start cell so it will have its correct value (Figure 6).

The cells next to the newly assigned cell are given a value of -1 to identify them as new frontier cells (Figure 7). A random wall is opened between the new cell and one of its frontier cells. The values of the two cells are adjusted to reflect the opened wall (Figure 8), then the cycle is repeated (figures 9 and 10).

If there are no frontier cells neighboring the new cell, the maze array is searched for any frontier cell (-1 value) and a wall is opened between it and its assigned neighbor; the cycle starts again. Border cells (100 value) cannot be assigned as frontier cells, thus keeping the outer wall of the maze intact.

When all cells have a value greater than zero, the maze is finished. Review the values of the cells in figures 6 through 10 as the maze is generated. Each cell is connected to a neighbor, except border cells. No part of the maze will be isolated from the rest.

Rat Maze program lines are as follows:

Number	**Explanation**
10	Dimensions the array MZ
20-100	Subroutines explained later
200	Border cells to 100
210-230	Title and need instructions?
240-250	Graphics on while generating maze
300	Start first cell
310	Make new cell current cell position (subroutine 70 sets any frontier cells to -1. If no frontier cells next to new cell then GOTO 330 [FL is zero]).
320	Open a wall and start cycle over (subroutine 80 ad-

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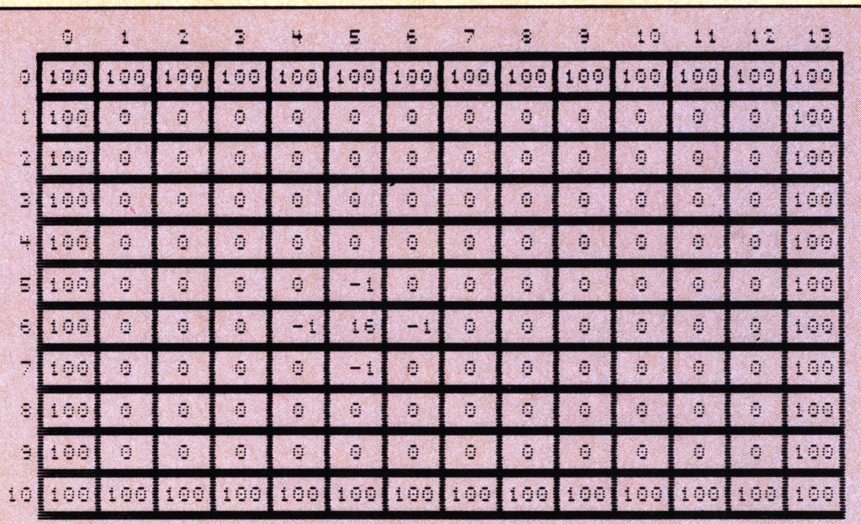
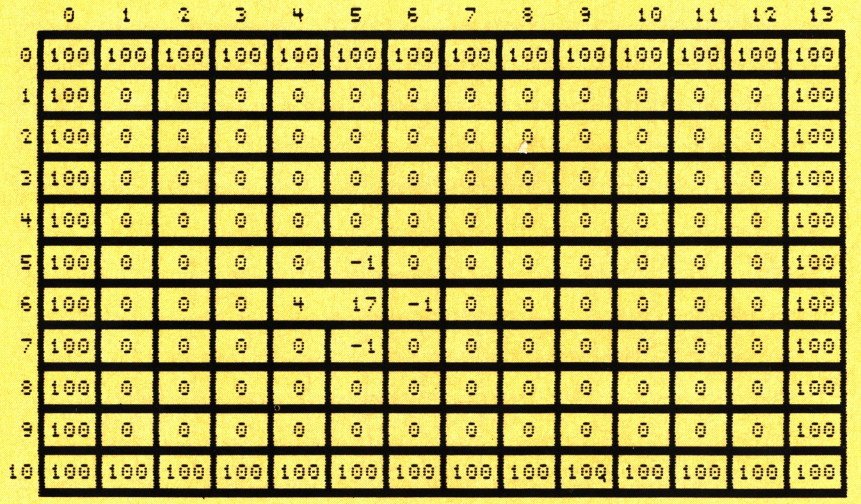
	justs the values of the two cells for the opened wall).
330	Find another frontier cell (if no frontier cells are found then the maze is finished, otherwise loop back. Subroutine 90 searches the array for any frontier cells).
410	Selects start position of rat and position of cheese
420	Makes start position the current position of rat
500	Clears screen and 'Z' is value of cell of rat's position
510-650	Uses value of 'Z' and DR (direction) to establish a wall and passage pattern for direction rat is facing
700	Left wall, front wall, right wall
710	Left passage, front wall, right wall
720	Left wall, front passage, right wall
730	Left wall, front wall, right passage
740	Left passage, front passage, right wall
750	Left wall, front passage, right passage
760	Left passage, front wall, right passage
770	Left passage, front passage, right passage (Subroutines 20-28 draw the passages and wall for the rat's current position. Subroutines 30-38 do the same for the next cell in the direction the rat is facing. Subroutines 40-48 draw the second cell. Subroutines 50-58 draw the third cell. Subroutines 100-108 use the value of SQ to keep track of which square is being drawn.)



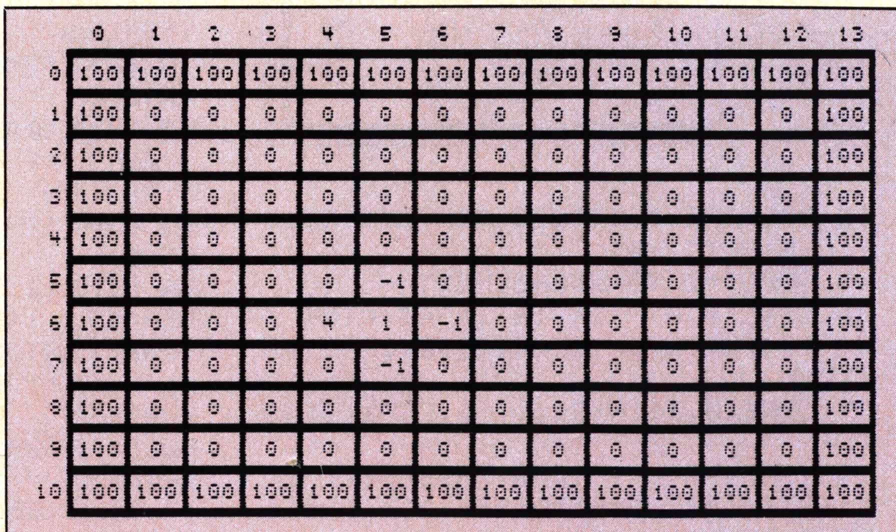
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	0	-1	0	0	0	0	0	0	0	100
6	100	0	0	0	-1	16	-1	0	0	0	0	0	0	100
7	100	0	0	0	0	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 4 Set frontier cells to –1 value



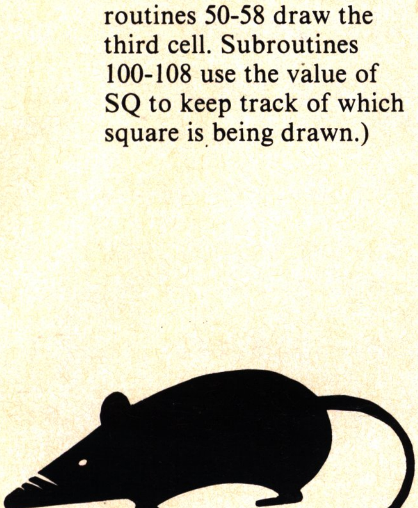
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	0	-1	0	0	0	0	0	0	0	100
6	100	0	0	0	4	17	-1	0	0	0	0	0	0	100
7	100	0	0	0	0	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

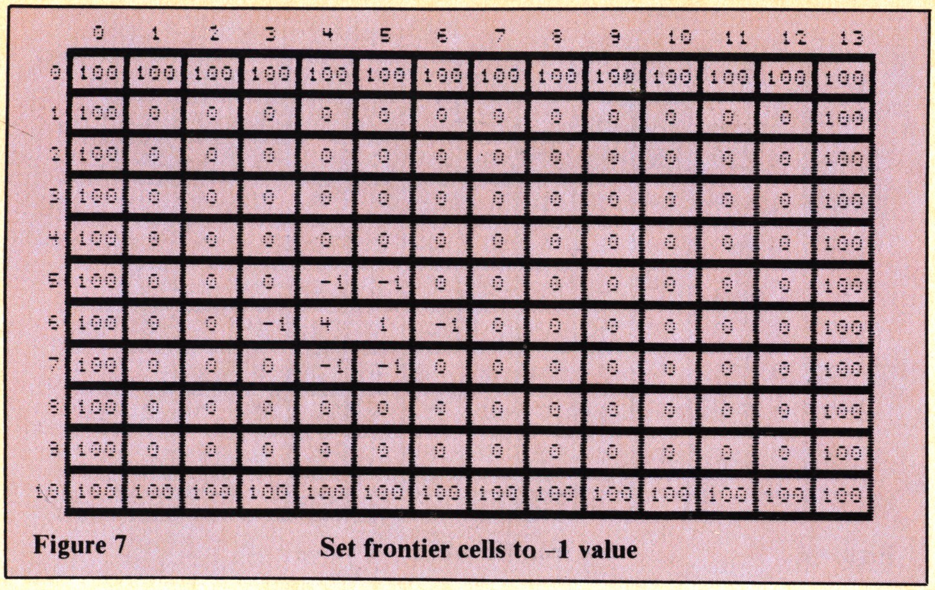
Figure 5 Open wall and adjust values of cells



	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	0	-1	0	0	0	0	0	0	0	100
6	100	0	0	0	4	1	-1	0	0	0	0	0	0	100
7	100	0	0	0	0	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

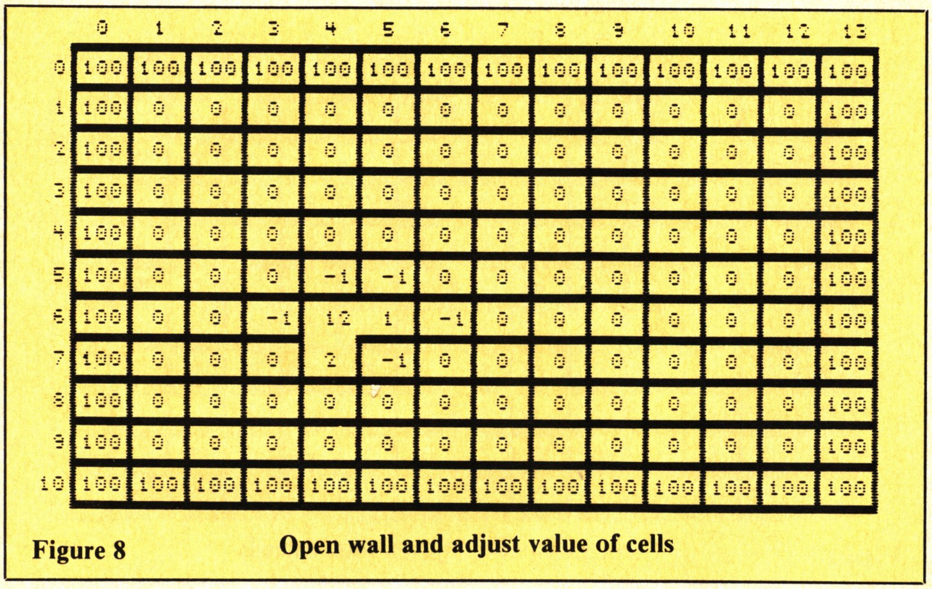
Figure 6 Value of first cell adjusted





	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	-1	-1	0	0	0	0	0	0	0	100
6	100	0	0	-1	4	1	-1	0	0	0	0	0	0	100
7	100	0	0	0	-1	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 7 Set frontier cells to -1 value



	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	-1	-1	0	0	0	0	0	0	0	100
6	100	0	0	-1	12	1	-1	0	0	0	0	0	0	100
7	100	0	0	0	2	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	0	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 8 Open wall and adjust value of cells

800	If the rat is facing a wall (FL is one) or three squares have been drawn (SQ is four), then finish drawing
810-860	Sets 'Z' a value of next cell ahead, checks for cheese and adds one to SQ (subroutine 60 draws the cheese in the correct location based on SQ).
900-921	Calculates distance to cheese and draws number at top of screen
930-990	Waits for valid key pressed
1000-1005	Turn left and go back to draw
1010-1015	Turn right and go back to draw
1020-1180	Check for valid move ahead; move rat if valid and go back to draw
1200	Go through maze array and set 'Z' equal to cell value; Draw left and top borders
1210	Select lines to draw based on value of 'Z'
1220	Draw bottom and right side lines for cell
1230	Draw bottom line only
1240	Draw right side only
1250	Draw cheese in position
1260	Draw start location
1270-1280	Draw location of rat at quit
1290	Wait for any key pressed (the maze can be drawn

40	203	921	210
76	51	1172	206
200	143	1290	220
410	190	END	64
770	40		

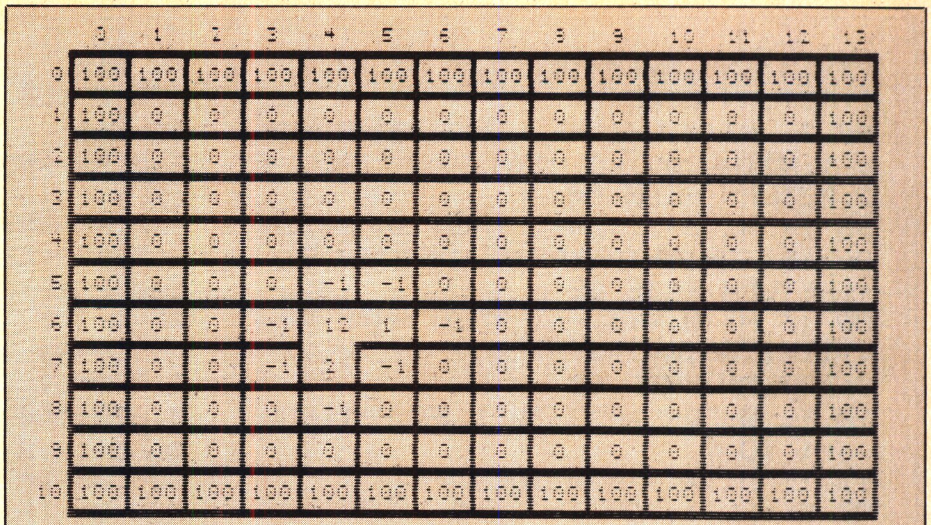
Listing 1: *RAT MAZE*

```
10 PCLEAR4:CLEAR200:DIM MZ(13,10
):CLS:GOTO200
15 FOR I=1 TO 250*3:NEXT
20 LINE(0,0)-(24,16),PSET:LINE-(
24,174),PSET:LINE-(0,190),PSET:R
ETURN
22 LINE(0,16)-(24,174),PSET,B:RE
TURN
24 LINE(254,0)-(230,16),PSET:LIN
E-(230,174),PSET:LINE-(254,190),
PSET:RETURN
26 LINE(230,16)-(254,174),PSET,B
:RETURN
28 LINE(24,16)-(230,174),PSET,B:
RETURN
30 LINE(24,16)-(80,50),PSET:LINE
-(80,140),PSET:LINE-(24,174),PSE
T:RETURN
32 LINE(24,50)-(80,140),PSET,B:R
ETURN
34 LINE(230,16)-(174,50),PSET:LI
NE-(174,140),PSET:LINE-(230,174)
,PSET:RETURN
36 LINE(174,50)-(230,140),PSET,B
:RETURN
38 LINE(80,50)-(174,140),PSET,B:
RETURN
40 LINE(80,50)-(116,74),PSET:LIN
E-(116,116),PSET:LINE-(80,140),P
```

	using this method because if the right side of a cell is open, the left side of its right-hand neighbor is open also, thus leaving the right side open on a cell takes care of both it and its neighbor at the same time).
1300	Win routine
1400-1440	Play again?
1500-1530	Instructions

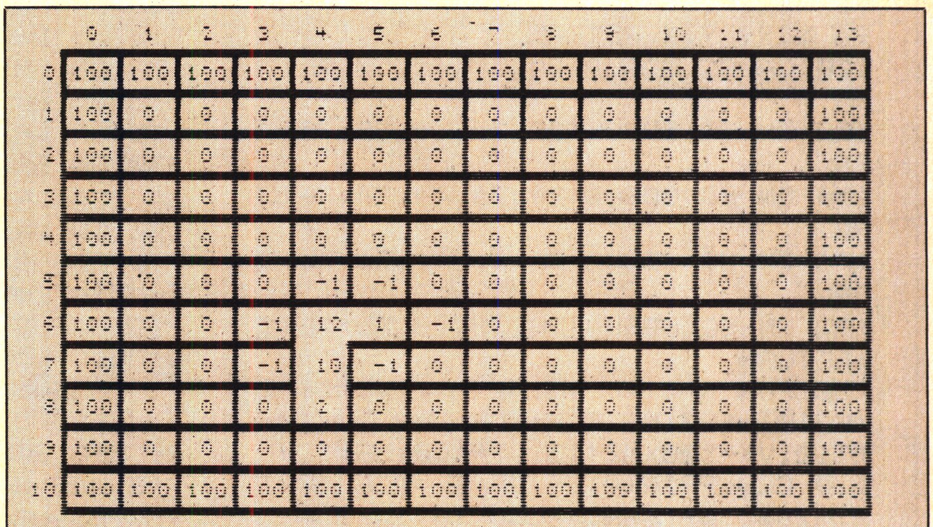
The *MAZEBLDR* program is a "generic" maze-generating program. It allows the player to select different maze dimensions and then draws a maze for that size. If large dimensions are used, the computer will spend a lot of time on the maze. Also, on 16K memory, an OM Error may occur.

Many changes can be made to both programs. You could put random treasures and hazards in the *Rat Maze* to make it an Adventure game. On the *MAZEBLDR*, different people could run the same maze and compete to see who could do it in the shortest time.



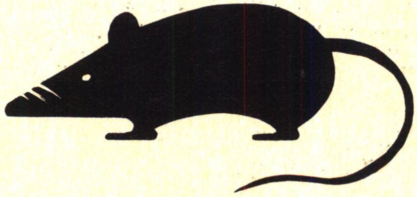
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	-1	-1	0	0	0	0	0	0	0	100
6	100	0	0	-1	12	1	-1	0	0	0	0	0	0	100
7	100	0	0	-1	2	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	-1	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 9 Set frontier cells to –1 value



	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	0	0	0	0	0	0	0	0	0	0	0	0	100
2	100	0	0	0	0	0	0	0	0	0	0	0	0	100
3	100	0	0	0	0	0	0	0	0	0	0	0	0	100
4	100	0	0	0	0	0	0	0	0	0	0	0	0	100
5	100	0	0	0	-1	-1	0	0	0	0	0	0	0	100
6	100	0	0	-1	12	1	-1	0	0	0	0	0	0	100
7	100	0	0	-1	10	-1	0	0	0	0	0	0	0	100
8	100	0	0	0	2	0	0	0	0	0	0	0	0	100
9	100	0	0	0	0	0	0	0	0	0	0	0	0	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 10 Open wall and adjust value of cells



```
SET:RETURN
42 LINE(80,74)-(116,116),PSET,B:
RETURN
44 LINE(174,50)-(138,74),PSET:LI
NE-(138,116),PSET:LINE-(174,140)
,PSET:RETURN
46 LINE(138,74)-(174,116),PSET,B
:RETURN
48 LINE(116,74)-(138,116),PSET,B
:RETURN
50 LINE(116,74)-(126,80),PSET:LI
NE-(126,110),PSET:LINE-(116,116)
,PSET:RETURN
52 LINE(116,80)-(126,110),PSET,B
:RETURN
54 LINE(138,74)-(128,80),PSET:LI
NE-(128,110),PSET:LINE-(138,116)
,PSET:RETURN
56 LINE(128,80)-(138,110),PSET,B
58 RETURN
60 ON SQ GOTO 62,64,66
62 LINE(118,156)-(136,170),PSET,
BF:RETURN
64 LINE(122,126)-(132,136),PSET,
BF:RETURN
66 LINE(124,100)-(130,106),PSET,
BF:RETURN
70 FL=0:FOR X=-1 TO 1 STEP 2
72 IF MZ(H+X,V)<=0 THEN MZ(H+X,V
)=-1:FL=1
74 IF MZ(H,V+X)<=0 THEN MZ(H,V+X
)=-1:FL=1
76 NEXT X:RETURN
80 DR=RND(4):ON DR GOTO 82,84,86
,88
82 IF MZ(H-1,V)=-1 THEN NH=H-1:N
```

```
V=V:MZ(NH,NV)=4:MZ(H,V)=MZ(H,V)+
1:RETURN ELSE 80
84 IF MZ(H,V-1)=-1 THEN NH=H:NV=
V-1:MZ(NH,NV)=8:MZ(H,V)=MZ(H,V)+
2:RETURN ELSE 80
86 IF MZ(H+1,V)=-1 THEN NH=H+1:N
V=V:MZ(NH,NV)=1:MZ(H,V)=MZ(H,V)+
4:RETURN ELSE 80
88 IF MZ(H,V+1)=-1 THEN NH=H:NV=
V+1:MZ(NH,NV)=2:MZ(H,V)=MZ(H,V)+
8:RETURN ELSE 80
90 FL=0:FOR X=12 TO 1 STEP-1:FOR
 Y=1 TO 9
92 IF MZ(X,Y)=>0 THEN 96
93 FL=FL+1:FOR I=-1 TO 1 STEP 2:
IF MZ(X+I,Y)>0 AND MZ(X+I,Y)<100
 THEN NH=X+I:NV=Y
94 IF MZ(X,Y+I)>0 AND MZ(X,Y+I)<
100 THEN NH=X:NV=Y+I
95 NEXT I
96 NEXT Y,X:RETURN
100 ON SQ GOSUB 20,30,40,50:RETU
RN
102 ON SQ GOSUB 22,32,42,52:RETU
RN
104 ON SQ GOSUB 24,34,44,54:RETU
RN
106 ON SQ GOSUB 26,36,46,56:RETU
RN
108 ON SQ GOSUB 28,38,48,58:FL=1
:RETURN
200 FOR H=0 TO 13:MZ(H,0)=100:MZ
(H,10)=100:NEXT H:FOR V=0 TO 10:
MZ(0,V)=100:MZ(13,V)=100:NEXT V
210 CLS:PRINT@139,"RAT MAZE":PRI
NT@232,"BY BEN BRUNOTTE"
220 PRINT@264,"COPYRIGHT  1984"
230 PRINT@355,"DO YOU NEED INSTR
UCTIONS?"
235 A$=INKEY$:IF A$="Y" THEN 150
0 ELSE IF A$<>"N" THEN 235
240 PMODE0,1:COLOR0,1:SCREEN1,1:
PCLS:DRAW"S8BM62,80RE3RERF2DF2R2
UEUEUEUE3RER2ER4ER3FR3FR2F2RFR2E
RERFRF2RF6L8GL38"
250 PSET(170,72):DRAW"BM16,152S1
6U6R3FDGL2NLF3BR3U5ER2FD3NL4D2BR
3BR2U6NL2R2BD6BR3BR7"
260 DRAW"U6F3E3D6BR3U5ER2FD3NL4D
2BR3NR4UE4UNL4BF3BD3NR4U3NR3U3R4
BD6":LINE(0,0)-(254,190),PSET,B
300 FOR H=1 TO 12:FOR V=1 TO 9:M
Z(H,V)=0:NEXT V,H:H=RND(12):V=RN
D(9):MZ(H,V)=16:GOSUB 70:GOSUB 8
0:MZ(H,V)=MZ(H,V)-16
310 H=NH:V=NV:GOSUB 70:IF FL=0 T
HEN 330
320 GOSUB 80:SOUND RND(255),1:GO
TO 310
330 GOSUB 90:IF FL=0 THEN 410 EL
SE 310
410 SV=RND(9):SH=1:CV=RND(9):CH=
12
420 RH=SH:RV=SV:DR=RND(4):PMODE
4,1:SCREEN1,1:COLOR1,0
500 PCLS:SOUND 10,2:SOUND 100,2:
SQ=1:Z=MZ(RH,RV):FL=0:IF CH=RH A
ND CV=RV THEN 1300
510 ON Z GOTO 520,530,540,550,56
0,570,580,590,600,610,620,630,64
0,650,770
520 ON DR GOTO 720,710,700,730
530 ON DR GOTO 730,720,710,700
540 ON DR GOTO 750,740,710,730
550 ON DR GOTO 700,730,720,710
560 ON DR GOTO 720,760,720,760
570 ON DR GOTO 730,750,740,710
580 ON DR GOTO 750,770,740,760
590 ON DR GOTO 710,700,730,720
600 ON DR GOTO 740,710,730,750
610 ON DR GOTO 760,720,760,720
620 ON DR GOTO 770,740,760,750
630 ON DR GOTO 710,730,750,740
640 ON DR GOTO 740,760,750,770
650 ON DR GOTO 760,750,770,740
700 GOSUB 100:GOSUB 104:GOSUB 10
8:GOTO 800
710 GOSUB 102:GOSUB 104:GOSUB 10
8:GOTO 800
720 GOSUB 100:GOSUB 104:GOTO 800
730 GOSUB 100:GOSUB 106:GOSUB 10
8:GOTO 800
740 GOSUB 102:GOSUB 104:GOTO 800
750 GOSUB 100:GOSUB 106:GOTO 800
760 GOSUB 102:GOSUB 106:GOSUB 10
8:GOTO 800
770 GOSUB 102:GOSUB 106:GOTO 800
800 IF FL=1 OR SQ=4 THEN 900
810 ON DR GOTO 820,830,840,850
820 Z=MZ(RH-SQ,RV):IF CH=RH-SQ A
ND CV=RV THEN GOSUB 60
825 GOTO 860
830 Z=MZ(RH,RV-SQ):IF CH=RH AND
CV=RV-SQ THEN GOSUB 60
835 GOTO 860
840 Z=MZ(RH+SQ,RV):IF CH=RH+SQ A
ND CV=RV THEN GOSUB 60
845 GOTO 860
850 Z=MZ(RH,RV+SQ):IF CH=RH AND
CV=RV+SQ THEN GOSUB 60
860 SQ=SQ+1:GOTO 510
900 IF ABS(CH-RH)>ABS(CV-RV) THE
N Z=ABS(CH-RH) ELSE Z=ABS(CV-RV)
910 DRAW"S8BM124,2":ON Z GOTO 91
1,912,913,914,915,916,917,918,91
9,920,921
```

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by
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```
911 DRAW"BRD4":GOTO 930
912 DRAW"R2D2L2D2R2":GOTO 930
913 DRAW"R2D2NL2D2L2":GOTO 930
914 DRAW"D2R2NU2D2":GOTO 930
915 DRAW"NR2D2R2D2L2":GOTO 930
916 DRAW"D4R2U2L2":GOTO 930
917 DRAW"R2D4":GOTO 930
918 DRAW"ND4R2D2NL2D2L2":GOTO 93
0
919 DRAW"ND2R2D2NL2D2":GOTO 930
920 DRAW"BLD4BR2R2U4L2D4":GOTO 9
30
921 DRAW"D4BR3U4"
930 SOUND 230,3:SOUND 239,1
940 A$=INKEY$:IF A$="" THEN 940
950 IF A$=CHR$(8) THEN 1000
960 IF A$=CHR$(9) THEN 1010
970 IF A$=CHR$(94) THEN 1020
980 IF A$="Q" THEN 1200 ELSE 930
1000 DR=DR-1:IF DR<=0 THEN DR=4
1005 GOTO 500
1010 DR=DR+1:IF DR>=5 THEN DR=1
1015 GOTO 500
1020 Z=MZ(RH,RV):ON Z GOTO 1030,
1040,1050,1060,1070,1080,1090,11
00,1110,1120,1130,1140,1150,1160
,1170
```

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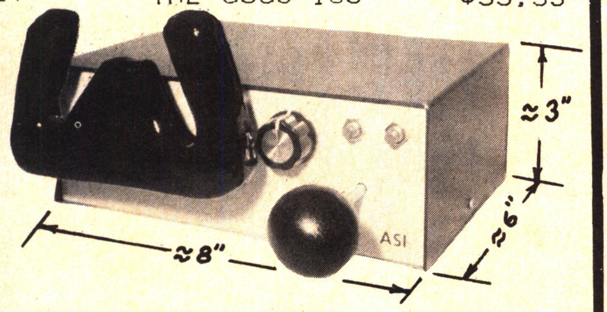

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```
1030 IF DR=1 THEN 1170 ELSE 930
1040 IF DR=2 THEN 1170 ELSE 930
1050 IF DR<=2 THEN 1170 ELSE 930
1060 IF DR=3 THEN 1170 ELSE 930
1070 ON DR GOTO 1170,930,1170,93
0
1080 ON DR GOTO 930,1170,1170,93
0
1090 IF DR=4 THEN 930 ELSE 1170
1100 IF DR=4 THEN 1170 ELSE 930
1110 ON DR GOTO 1170,930,930,117
0
1120 ON DR GOTO 930,1170,930,117
0
1130 IF DR=3 THEN 930 ELSE 1170
1140 IF DR>=3 THEN 1170 ELSE 930
1150 IF DR=2 THEN 930 ELSE 1170
1160 IF DR=1 THEN 930 ELSE 1170
1170 IF DR=1 THEN RH=RH-1
1172 IF DR=2 THEN RV=RV-1
1174 IF DR=3 THEN RH=RH+1
1176 IF DR=4 THEN RV=RV+1
1180 GOTO 500
1200 CLS:PRINT@130,"PRESS ANY KE
Y WHEN FINISHED            LOOKING
AT MAZE.":GOSUB 15:COLOR0,1:SCRE
EN 1,1:PCLS:LINE(0,180)-(0,0),PS
ET:LINE-(240,0),PSET:FOR H=1 TO
12:FOR V=1 TO 9:Z=MZ(H,V)
1210 ON Z GOTO 1220,1220,1220,12
30,1230,1230,1230,1240,1240,1240
,1240,1250,1250,1250,1250
1220 LINE(20*H-20,20*V)-(20*H,20
*V),PSET:LINE-(20*H,20*V-20),PSE
T:GOTO 1250
1230 LINE(20*H-20,20*V)-(20*H,20
*V),PSET:GOTO 1250
1240 LINE(20*H,20*V)-(20*H,20*V-
20),PSET
1250 NEXT V,H:CIRCLE(20*CH-10,20
*CV-10),6:PAINT(20*CH-10,20*CV-1
0),0,0
1260 LINE(20*SH,20*SV-20)-(20*SH
-20,20*SV),PSET:LINE(20*SH,20*SV
)-(20*SH-20,20*SV-20),PSET
1270 LINE(20*RH-4,20*RV-4)-(20*R
H-16,20*RV-16),PSET,BF
1280 LINE(20*RH-4,20*RV-4)-(20*R
H-16,20*RV-16),PRESET:LINE(20*RH
-4,20*RV-16)-(20*RH-16,20*RV-4),
PRESET
1290 IF INKEY$="" THEN 1290 ELSE
 1400
1300 FOR Z=0 TO 10:CLS(RND(9)-1)
:PRINT@197,"YOU GOT THE CHEESE!!
";:SOUND RND(255),2:NEXT Z
1400 PRINT@448,"  sAME MAZE, nEW
 MAZE, OR qUIT            ENTER
```

The HJL-57 Keyboard

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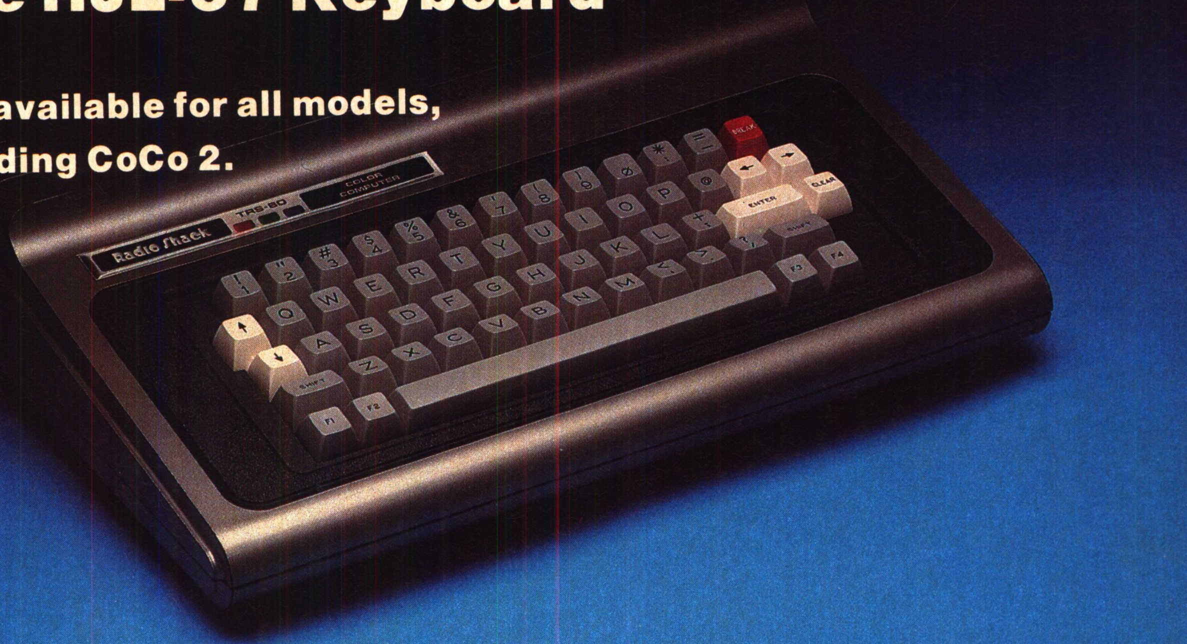

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Chicago

May 17-19

Show Schedule:

Friday evening — Exhibit hall open from 7 p.m. to 10 p.m.

Saturday — CoCo Community Breakfast at 8 a.m.

Exhibit Hall opens at 10 a.m. and closes at 6 p.m.

Sunday — Exhibit Hall open from 11 a.m. to 4 p.m.

Where but at **RAINBOWfest** could you meet so many CoCo enthusiasts, see so many new products, and attend seminars that are of immediate assistance? It's the next best thing to receiving the latest issue of THE RAINBOW in your mailbox.

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To make it easier for you to attend, we schedule **RAINBOWfest** in three parts of the country. If you missed the fun in Irvine, Calif., why don't you make plans now to be with us in Chicago, Ill., or New Brunswick, N.J.? Each show is unique, offering fun, new acquaintances, and great sharing experiences. For members of the family who don't share your affinity for CoCo, you'll be comfortable knowing that each **RAINBOWfest** is located in an area that will provide fun and enjoyment for all.

Our Chicago show is being held at the Hyatt Regency Woodfield, adjacent to the Woodfield Mall, one of the largest indoor shopping centers in the world. The Hyatt Regency offers special rates for **RAINBOWfest**. The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. There will be no exhibition hours or seminars Saturday evening. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

A well-known speaker will again keynote the highly popular CoCo Community Breakfast. And you can set your own pace in the exhibit hall interspaced with a number of seminar sessions on all aspects of CoCo — from improving your BASIC skills to working with the OS-9 system.

But most of all, there will be exhibitors. Lots of them. All ready to demonstrate products of every kind. It's a time for unveiling brand new products. Many have special buys for **RAINBOWfest**. If you've been eyeing something in THE RAINBOW, you can try it out and take it home that very day.

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RAINBOWfest CHICAGO

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- **Richard Parry** **Speech Recognition**

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- **Dale L. Puckett** **Beginners Tour Of OS-9**
  Beginners Tour Of BASIC09

The author of *THE COMPLETE RAINBOW GUIDE TO OS-9* and *THE OFFICIAL BASIC09 TOUR GUIDE* will discuss the advantages of the BASIC09 language, explain the available commands, and demonstrate various functions. He also will give an overview of how to use the multitasking OS-9 operating system. Dale will be autographing copies of *THE COMPLETE RAINBOW GUIDE TO OS-9*.

- **Dan Downard** **Inside Your Color Computer**

The technical editor of THE RAINBOW takes you inside your Color Computer, discussing hardware and software interfacing and explaining the differences between the various boards and disk drives. He also will answer a great variety of technical questions.

- **Wayne Day** **Exploring CompuServe & The Color SIG**

The system operator of The Color SIG on the CompuServe Information Service will explore the many special services available to CoCo users. He also will discuss innovations on The Color SIG that allow you to make maximum use of the service at minimum cost.

- **Richard White** **Electronic Spreadsheets**

A regular columnist in THE RAINBOW, he will discuss electronic spreadsheets for the Color Computer: why they are practical for you and how CoCo commercial spreadsheet products compare with popular products for other computers.

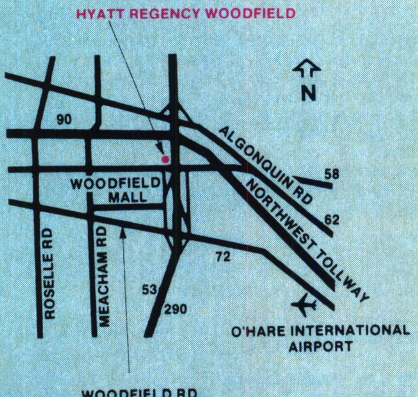
- **Martin Goodman** **Hardware and Software Interfacing**

A self-taught programmer, he has been instrumental in the design and marketing of excellent Color Computer software, including *GRAPHICOM*. He will discuss ways to improve the packaging of software and hardware products.

- **Jim Reed** **Writing for THE RAINBOW**

The managing editor of THE RAINBOW will tell you how to submit programs and articles to the magazine — for fun and profit. Jim also is senior editor of PCM — The Personal Computing Magazine For Tandy Users, which focuses on the Tandy 100, 200, 1000, 1200 and 2000 computers.

Plus . . . other great seminars on timely topics are planned as well. Watch for details in THE RAINBOW next month!



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```
CHOICE"
1410 A$=INKEY$:IF A$="" THEN 141
0
1420 IF A$="S" THEN 420
1430 IF A$="N" THEN 240
1440 IF A$="Q" THEN 220 ELSE 140
0
1500 CLS:PRINT"  YOU HAVE A RAT'
S EYE VIEW OF  THE MAZE. THE NUM
BER OF SQUARES TO THE CHEESE AS
THE FLEA FLIES IS DISPLAYED AT T
HE TOP OF THE  SCREEN."
1510 PRINT"YOUR OPTIONS ARE:
             RIGHT ARROW KEY=TUR
N RIGHT ON SAME SQUARE.
             LEFT ARROW KEY=TURN
 LEFT ON   SAME SQUARE."
1520 PRINT"  UP ARROW KEY=MOVE O
NE SQUARE  FORWARD.
             Q = QUIT AND SEE MA
ZE. X IS   YOUR START POSITION,
x IS YOUR  POSITION WHEN QUIT, A
ND CIRCLE  IS THE CHEESE.";
1530 IF INKEY$="" THEN 1530 ELSE
 240
```

82	122
410	85
1120	18
END	118

Listing 2: *MAZEBLDR*

```
10 CLS:PRINT@11,"MAZE GAME":PRIN
T@40,"BY BEN BRUNOTTE":PRINT@72,
"COPYRIGHT  1984":PRINT@128,"ENT
ER NUMBER OF SQUARES ACROSS  [5
TO 50]";:INPUT A:IF A<5 OR A>50
THEN 10
20 PRINT@224,"ENTER NUMBER OF SQ
UARES DOWN    [5 TO 36]";:INPUT
B:IF B<5 OR B>36 THEN 20
25 C=A+1:D=B+1:Z=RND(-TIMER):PRI
NT:PRINT"    USE ARROW KEYS TO M
OVE.  YOUSTART ON THE LEFT SIDE
AND YOUR OBJECTIVE IS ON THE RIG
HT SIDE."
30 DIM MZ(C,D):IF ABS(250/A)<ABS
(190/B) THEN W=ABS(250/A) ELSE W
=ABS(190/B)
40 GOTO 290
70 FL=0:FOR X=-1 TO 1 STEP 2
72 IF MZ(H+X,V)<=0 THEN MZ(H+X,V
```

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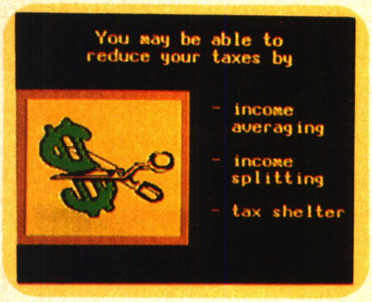

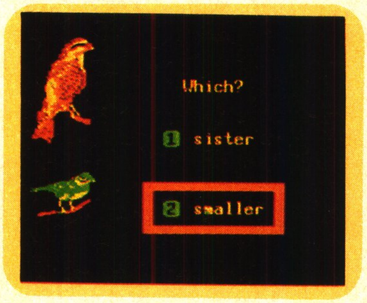

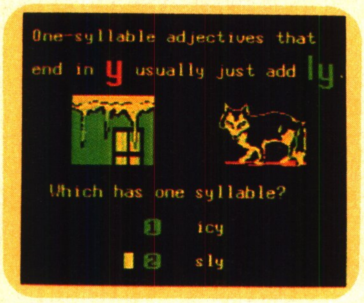

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Numeric Functions:	ABS, POS, TIMER, RND, ASC, TAB, CAL, JOYSTK, PEEK, POKE, LOC, LOF, EOF, FREE, CVN, ERR, VARPTR, SWAP
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Program Control:	FOR/NEXT/STEP, GOTO/GOSUB, IF/THEN/ELSE, RETURN, STOP, RETI, ON n GOTO/GOSUB, ON ERROR, ON RESET, ON IRQ/FIRQ/NMI, ON OVR/NOVR, EXEC, LET
Directives:	ORG, REM OR ', END, DIM, END, BASE, RAM, ON/OFF, RAM64K, HIRES, GENERATE, DPSET, STACK
Editor Commands:	LINE EDIT, AUTO EDIT, COPY, MOVE, RENUMBER, AUTO LINE#, PRINTER, LIST, DELETE, SEARCH, REPLACE, BAUD RATE, PRINTER, CBASIC, TAPPEND, SKIP, SIZE, LOAD, SAVE, APPEND, KILL, DIR, and much, much more.

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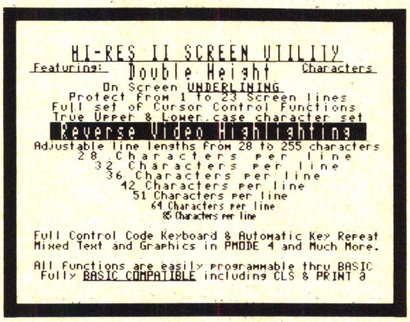

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PROGRAM FEATURES	HI-RES II NEW	HI-RES I OLD	BRAND X
Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Biack	Buff/Black	Buff/Black
X,Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16.32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

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```
)=-1:FL=1
74 IF MZ(H,V+X)<=0 THEN MZ(H,V+X
)=-1:FL=1
76 NEXT X:RETURN
80 DR=RND(4):ON DR GOTO 82,84,86
,88
82 IF MZ(H-1,V)=-1 THEN NH=H-1:N
V=V:MZ(NH,NV)=4:MZ(H,V)=MZ(H,V)+
1:RETURN ELSE 80
84 IF MZ(H,V-1)=-1 THEN NH=H:NV=
V-1:MZ(NH,NV)=8:MZ(H,V)=MZ(H,V)+
2:RETURN ELSE 80
86 IF MZ(H+1,V)=-1 THEN NH=H+1:N
V=V:MZ(NH,NV)=1:MZ(H,V)=MZ(H,V)+
4:RETURN ELSE 80
88 IF MZ(H,V+1)=-1 THEN NH=H:NV=
V+1:MZ(NH,NV)=2:MZ(H,V)=MZ(H,V)+
8:RETURN ELSE 80
90 FL=0:FOR X=A TO 1 STEP-1:FOR
Y=1 TO B
92 IF MZ(X,Y)=>0 THEN 96
93 FL=FL+1:FOR I=-1 TO 1 STEP 2:
IF MZ(X+I,Y)>0 AND MZ(X+I,Y)<100
 THEN NH=X+I:NV=Y
94 IF MZ(X,Y+I)>0 AND MZ(X,Y+I)<
100 THEN NH=X:NV=Y+I
95 NEXT I
96 NEXT Y,X:RETURN
290 FOR H=0 TO C:MZ(H,0)=100:MZ(
H,D)=100:NEXT H:FOR V=0 TO D:MZ(
0,V)=100:MZ(C,V)=100:NEXT V
300 FOR H=1 TO A:FOR V=1 TO B:MZ
(H,V)=0:NEXT V,H:H=RND(A):V=RND(
B):MZ(H,V)=16:GOSUB 70:GOSUB 80:
MZ(H,V)=MZ(H,V)-16
310 H=NH:V=NV:GOSUB 70:IF FL=0 T
HEN 330
320 GOSUB 80:SOUND RND(255),1:GO
TO 310
330 GOSUB 90:IF FL=0 THEN 410 EL
SE 310
410 SV=RND(B):SH=1:CV=RND(B):CH=
A
420 RH=SH:RV=SV:PMODE 4,1:COLOR
0,1:SCREEN 1,1:PCLS:GOTO 1200
940 A$=INKEY$:IF A$="" THEN 940
945 LINE(W*RH-2,W*RV-2)-(W*RH-W+
2,W*RV-W+2),PRESET,BF:SOUND 200,
2
950 IF A$=CHR$(8) THEN DR=1:GOTO
 1020
960 IF A$=CHR$(9) THEN DR=3:GOTO
 1020
970 IF A$=CHR$(94) THEN DR=2:GOT
O 1020
980 IF A$=CHR$(10) THEN DR=4 ELS
E 1177
1020 Z=MZ(RH,RV):ON Z GOTO 1030,
1040,1050,1060,1070,1080,1090,11
00,1110,1120,1130,1140,1150,1160
,1170
1030 IF DR=1 THEN 1170 ELSE 1177
1040 IF DR=2 THEN 1170 ELSE 1177
1050 IF DR<=2 THEN 1170 ELSE 117
7
1060 IF DR=3 THEN 1170 ELSE 1177
1070 ON DR GOTO 1170,1177,1170,1
177
1080 ON DR GOTO 1177,1170,1170,1
177
1090 IF DR=4 THEN 1177 ELSE 1170
1100 IF DR=4 THEN 1170 ELSE 1177
1110 ON DR GOTO 1170,1177,1177,1
170
1120 ON DR GOTO 1177,1170,1177,1
170
1130 IF DR=3 THEN 1177 ELSE 1170
1140 IF DR>=3 THEN 1170 ELSE 117
7
1150 IF DR=2 THEN 1177 ELSE 1170
1160 IF DR=1 THEN 1177 ELSE 1170
1170 IF DR=1 THEN RH=RH-1
1172 IF DR=2 THEN RV=RV-1
1174 IF DR=3 THEN RH=RH+1
1176 IF DR=4 THEN RV=RV+1
1177 RETURN
1200 LINE(0,B*W)-(0,0),PSET:LINE
-(W*A,0),PSET:FOR H=1 TO A:FOR V
=1 TO B:Z=MZ(H,V)
1210 ON Z GOTO 1220,1220,1220,12
30,1230,1230,1230,1240,1240,1240
,1240,1250,1250,1250,1250
1220 LINE(W*H-W,W*V)-(W*H,W*V),P
SET:LINE-(W*H,W*V-W),PSET:GOTO 1
250
1230 LINE(W*H-W,W*V)-(W*H,W*V),P
SET:GOTO 1250
1240 LINE(W*H,W*V)-(W*H,W*V-W),P
SET
1250 NEXT V,H:R=ABS(W/2):CIRCLE(
W*CH-R,W*CV-R),R-1
1270 LINE(W*RH-2,W*RV-2)-(W*RH-W
+2,W*RV-W+2),PSET,BF
1290 IF CV=RV AND CH=RH THEN 130
0 ELSE GOSUB 940:GOTO 1270
1300 FOR Z=0 TO 10:CLS(RND(9)-1)
:PRINT@197,"YOU GOT THE CHEESE!!
";:SOUND RND(255),2:NEXT Z
1400 PRINT@448,"  sAME MAZE, nEW
 MAZE, OR qUIT            ENTER
CHOICE"
1410 A$=INKEY$:IF A$="" THEN 141
0
1420 IF A$="S" THEN 420
1430 IF A$="N" THEN CLS:GOTO 290
1440 IF A$="Q" THEN RUN ELSE 140
0
```

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PIPELINE

A GRAND BBS — There's an impressive new bulletin board online, helping to partially fill the gap created by the recent loss of Bob Rosen's four nationally known Rainbow Connection boards. It's based in the "Big Apple" and appropriately named Grand Central Terminal.

The download section features some remarkable high resolution graphics, help files for some of the more popular Adventure games, a PEEK and POKE file, and more. The system operates on four 40-track disk drives and is open 24 hours a day.

Users wishing their own ID number and fast logon should register by leaving their name and telephone number in a sign-off message on the system. Registering gives you more time on the system, message privileges, and use of a second download section.

To view the system, call (212) 682-0681.

* * *

"KNOWS THE WAY" BACK, TOO — Speaking of Bob Rosen, the man behind Spectrum Projects has returned to New York after operating Spectrum Projects West for several months in San Jose, Calif.

Bob says he enjoyed the "laid back" atmosphere of The Golden State, but he missed the "rush, rush, rush" of his New York home.

Spectrum Projects, by the way, has two new products available through Radio Shack's Express Order Software Program — *CoCo Checker* (Cat. No. 90-289), a diagnostics program selling for $19.95 on disk; and *Disk Utility 2.1* (Cat. No. 90-290), a multifeatured disk utility program, $24.95 on disk.

* * *

FARM ROUNDUP — America's farmers, whose plight was dramatized by President Reagan's recent veto of a farm assistance bill, can count on continued assistance from *COCO-AG*, a new newsletter published by Kelly Klaas of Twin Falls, Idaho.

A recent issue included information about a program Klaas has written to help farmers determine how much fertilizer to spread on their fields, based upon soil testing. There are three parts to the program, one for beans and peas, another for wheat/barley and one for corn.

The newsletter includes a listing of 15 agricultural-related programs available from the *COCO-AG* Farm Computer Users Group, such as *COWFEED*, which calculates the amount of feed and nutrient requirements for livestock; and *DRYRUN*, which evaluates the advantages and alternatives of when to sell a grain crop.

For subscription information, write: Kelly Klaas, Route 1, Twin Falls, ID 83301.

* * *

COCO THINK TANK? — Can computers be made to think, to become self-aware . . . to have souls?

These are just a few of the questions addressed in *Artificial Intelligence: How Machines Think*, a newly released book from Baen Enterprises.

Historic and current development of artificial intelligence are explored, including a "sixth generation" of computers that may be able to study, think and make independent decisions on their own.

For additional information, write: Baen Enterprises, 8 West 36th Street, New York, NY 10018.

* * *

KEY CHANGES. Aspen Graphics has introduced Data-Cals, a new line of color keyboard decals which allows the user to change the nomenclature of keys for special jobs. Two formats are available: opaque, for changing or covering present keys, and transparent, for adding information to existing keys. They are also said to be ideal for foreign language translations.

Other features include choice of primary and custom colors, a durable material that allows you to remove or interchange the decals, and sizes for both the top and front of present keys.

For more information, write: Overlay Division, Aspen Graphics, 1032 West 23rd Street, Tempe, AZ 85282.

* * *

ADVENTUROUS. Bill Cook, author of *The Adventure Generator* (*TAG*), will soon be introducing *The Adventure Builder* (*TAB*). Like *TAG*, the new product will create Adventure programs, but will include many other features such as multiple sessions, re-editing of previous creations, scroll-protected, split-screen outputs and the capacity to create larger Adventures. *TAB* will sell for $39.95 and will be available only on disk.

Bill no longer is associated with JARB Software. The new source for both *TAG* and *TAB* is his new company: Island Software, P.O. Box 1402, Oak Harbor, WA 98277.

* * *

AGAINST THE WALL. Some Silicon Valley engineers, tired of thumbing through books and tacking unsightly photocopies of ASCII symbols and other codes on the wall, have created an attractive alternative. It's a cross-referenced, color-coded poster that is easy to read and simple to use.

In addition to ASCII codes, the poster includes Hex, decimal and binary symbols. Plus, it features GPIB (General Purpose Interface Bus) — advanced codes that most scientific equipment and instruments use to communicate with each other and with computers.

The heart of the chart is a grid of 128 cells, each with the ASCII character in the middle and its corresponding Hex, decimal or GPIB codes in each corner.

The format allows users to quickly convert hexadecimal numerals to ASCII characters or other numbering systems.

The chart comes in two sizes — as a 22 by 28-inch poster, and in three-hole-punched notebook dimensions, 8½ by 11 inches. Both are printed on heavyweight paper. The suggested retail price is $10 for the poster and $4.75 for the notebook size.

For more information, write: BNW Associates, P.O. Box 7725, San Jose, CA 95125.

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* - Not for CoCo Mod. 26-3127/3134/3136

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FORMATTER

By James A. Sanford

Long, multiple statement BASIC lines are quick to type and efficient in terms of memory and run time, but they are *so* hard to read. This is especially true when you're trying to debug a long program after a long, bleary-eyed session at the keyboard.

Wouldn't it be nice if there were some way to take advantage of multiple statement lines and still have a convenient, readable listing? The listing formatter described here allows the best of both worlds.

How it Works

The concept involved is easy. Just check each character about to be printed. If it happens to be a colon (multiple statements coming), move down a line and indent some from the left margin before printing it, then print the rest of the line.

Making a program actually do this is not much harder. Listing 1 shows an assembly language listing which will make it happen.

The routine called *Begin* initializes the program. First, it gets the address stored at $0168 by BASIC: $0168 is an intercept called prior to executing BASIC's character output routine. The original contents are stored so that *Formatter* can be disabled.

Preserving the original information in this manner allows the same program to be used on any system, with or without disk, and even with some other patch already installed. This done, the program will place the address for *Formatter* at $0168 and return control to BASIC.

When a character is to be output, BASIC will jump to $0167; this will tell BASIC to jump to the beginning of the *Formatter*. When *Formatter* is called, the character to be printed is contained in 'A.'

The routine labeled *Start* first preserves all 6809 registers, then checks to see if the character to be printed is a colon. If not, all registers are restored, and the program now jumps to where it would have without *Formatter*.

It is necessary to preserve registers prior to checking for a colon. This is the case since BASIC cares very much what happens to the condition code register.

If the character to be output is a colon, the program branches to the routine labeled *Form*. This prints a carriage return and five spaces. Following this, all registers (including the colon contained in 'A') are restored and program control returns to BASIC, as if *Formatter* wasn't even there.

The actual printing is done by the routine called *Print*. This routine checks the device code to see where the character is destined. It then routes the character to the screen or printer as appropriate, and does nothing if the character is to go anywhere else.

Finally, the routine labeled *Kill* exists to restore BASIC's original pointer, disabling *Formatter*. This is necessary if you have some other patch you may need to use periodically.

Note that the routine is written in position-independent code, so it can be placed in any convenient memory locations.

(James Sanford is an electrical engineer and a ham radio operator [WB4GCS]. Trained in nuclear propulsion, he is serving in the U.S. Navy.)

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Using the Formatter

With a program this short, entering it is easy. If you have an editor/assembler, use the source code in Listing 1, then assemble and save to tape or disk. To enable *Formatter*, type `EXEC`; to disable it, it will be necessary to `EXEC` the address where the *Kill* routine is stored.

If you don't have an editor/assembler, it is possible to `POKE` in the object code in Listing 1. Operating instructions are the same as if it had been assembled.

Finally, Listing 2 shows a BASIC program which will generate the machine code and give directions for use.

Once *Formatter* is enabled, any time a colon appears, it will be printed one line down and indented five spaces. This will take place whether the colon is in a program listing or some printed text.

One word of caution is in order. The formatter will work when editing programs, but must be used with care. If you backspace into the five blank spaces, you will be spacing over the text which preceded the colon in the buffer. This happens since there is no longer a one-to-one correspondence between what is on the screen and what is in the edit buffer. If you then insert or delete something, you will actually be modifying the program line, not the spaces before the colon.

Because of this potential problem, I recommend that you use *Formatter* to determine where you need changes, then disable it prior to editing any lines. Unless you're extremely sure of what you are doing, this is the safest course.

(For those having questions, you may contact Mr. Sanford at the following address: 15 Whitlor Dr., Mt. Holly, NY 08060.)

Listing 1:

```
                    00100 **************************
                    00110 *       FORMATTER          *
                    00120 *  A ROUTINE TO FORMAT      *
                    00130 *    BASIC LISTINGS         *
                    00140 *        COPYRIGHT          *
                    00150 *      (C) 1983  BY         *
                    00160 *   JAMES A. SANFORD        *
                    00170 *  ALL RIGHTS RESERVED      *
                    00171 ***************************
                    00172 *
                    00173 *
                    00174 *
                    00175 *
                    00180 * RELOCATABLE, PUT IN GRAPHICS
0E10                00190         ORG     $0E10
0E10 34   77        00200 START   PSHS    X,Y,U,A,B,CC    *PRESERVE ALL
0E12 81   3A        00210         CMPA    #':     *DOES A CONNTAN A COLON?
0E14 27   06        00220         BEQ     FORM    *IF SO, FORMAT
0E16 35   77        00230 RETURN  PULS    X,Y,U,A,B,CC    *OTHERWISE, RESTORE
0E18 6E   9D 0011   00240         JMP     [ADDR,PCR]      *AND RETURN
0E1C 86   0D        00250 FORM    LDA     #$0D    *MAKE A A CARRIAGE RETURN
0E1E BD   0E44      00260         JSR     PRINT   *PRINT IT
0E21 86   20        00270         LDA     #$20    *NOW MAKE A A SPACE
0E23 C6   05        00280         LDB     #5      *FOR 5 TIMES,
0E25 BD   0E44      00290 SPACE   JSR     PRINT   *PRINT IT
0E28 5A             00300         DECB            *COUNTER
0E29 26   FA        00310         BNE     SPACE   *DONE?
0E2B 20   E9        00320         BRA     RETURN  *IF SO, BACK TO BASIC
0E2D                00330 ADDR    RMB     2       *STORAGE OF RETURN ADDRESS
                    00340 *ROUTINE TO DISABLE THE FORMATTER
0E2F BE   0E2D      00350 KILL    LDX     ADDR    *RESTORE BASIC'S
0E32 BF   0168      00360         STX     $0168   *POINTER
0E35 39             00370         RTS             *RETURN TO BASIC
                    00380 *ROUTINE TO ENABLE THE FORMATTER
0E36 BE   0168      00390 BEGIN   LDX     $0168   *STASH BASIC'S
0E39 AF   8D FFF0   00400         STX     ADDR,PCR *POINTER
0E3D 8E   0E10      00410         LDX     #START  *TELL BASIC
0E40 BF   0168      00420         STX     $0168   *ABOUT FORMATTER
0E43 39             00430         RTS             *RETURN TO BASIC
                    00440 *ROUTINE TO PRINT A CHARACTER
0E44 7D   006F      00450 PRINT   TST     DEVNUM  *WHICH DEVICE?
0E47 1027 94BF      00460         LBEQ    SCREEN  *IF 0 THEN SCREEN PRINTT
0E4B 34   02        00470         PSHS    A       *PRESERVE A
0E4D B6   006F      00480         LDA     DEVNUM  *GET DEVICE
0E50 8B   02        00490         ADDA    #2
0E52 35   02        00500         PULS    A       *RESTORE A
0E54 1027 9467      00510         LBEQ    PRTR    *IF -2 THEN PRINTER
0E58 39             00520         RTS             *RETURN
          A30A      00530 SCREEN  EQU     $A30A
          A2BF      00540 PRTR    EQU     $A2BF
          006F      00550 DEVNUM  EQU     $6F
          0E36      00560         END     BEGIN
00000 TOTAL ERRORS
```

Listing 2: *FORMAT*

```
10 'PROGRAM TO GENERATE FORMATTE
R MACHINE LANGUAGE PROGRAM.
15 'COPYRIGHT (C) 1983 BY JAMES
A. SANFORD
16 ' ALL RIGHTS RESERVED
20 FOR A = &H 0E10 TO &H0E58:REA
D D:POKE A,D:NEXTA
30 CLS:PRINT:PRINT"NOW CSAVEM OR
 SAVEM 'FORMAT',&H0E10,&H0E58,&H
0E36":PRINT
40 PRINT"TO ENABLE, TYPE <EXEC>
OR ":PRINT"<EXEC &H 0E36>.":PRIN
T:PRINT"TO DISABLE, TYPE":PRINT"
     <EXEC &H 0E2F>."
50 DATA 52, 119, 129, 58, 39, 6,
 53, 119, 110, 157
60 DATA 0, 17, 134, 13, 189, 14,
 68, 134, 32, 198
70 DATA 5, 189, 14, 68, 90, 38,
250, 32, 233, 203
80 DATA 74, 190, 14, 45, 191, 1,
 104, 57, 190, 1
90 DATA 104, 175, 141, 255, 240,
 142, 14, 16, 191, 1
100 DATA 104, 57, 125, 0, 111, 1
6, 39, 148, 191, 52
110 DATA 2, 182, 0, 111, 139, 2,
 53, 2, 16, 39
120 DATA 148, 103, 57
```

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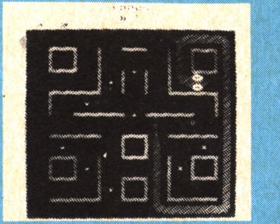

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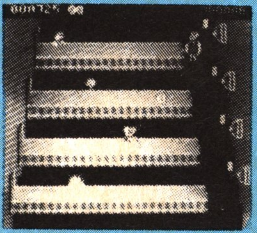

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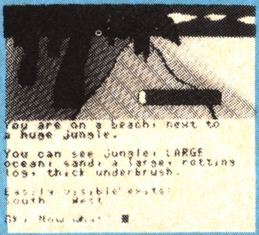

```
ou are on a beach; next to
a huge jungle.

You can see jungle; LARGE
ocean; sand; a larger rotting
log; thick underbrush.

Easily visible exits:
South   West
```

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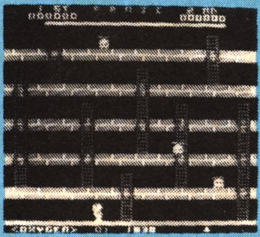

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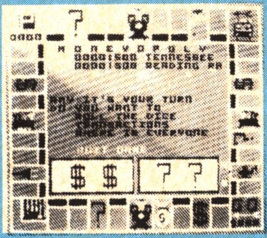

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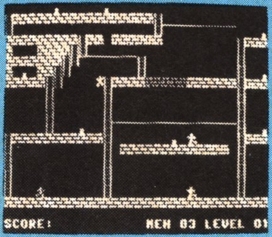

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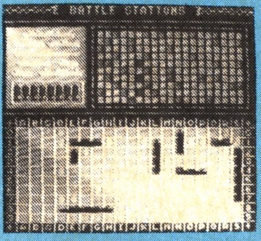

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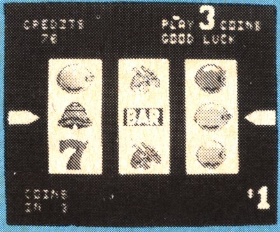

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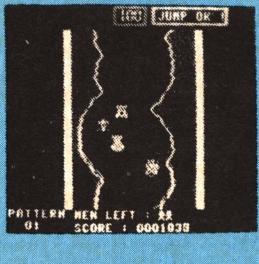

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Return Of The Hangmenoids!

By Fred B. Scerbo
Rainbow Contributing Editor

(Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW*. Remember, keep your ideas specific, and don't forget that this is* BASIC*. All programs resulting from your wishes are for your use but remain the property of the author.)*

Three months ago, I introduced the first program which I developed to use with the new voice synthesizers available for the Color Computer (February 1985, "Let CoCo Talk You Into A Better Education," Page 118). That program, *Talking Micro Math Lab*, has resulted in some interesting mail which has given birth to this month's contribution in the "Wishing Well": *Talking Tri-Planetary Hangmenoids*.

The best part about this program is that it will help fill a number of wishes in the educational field, while still being a valid contribution to your game collection.

Another Hangperson?

Like *Demon's Defiance* from the March 1985 "Wishing Well," the original *Tri-Planetary Hangmenoids* was written about two years ago when the MC-10 first came out. I was looking to develop some quick, small programs to fit in the MC-10's 4K memory. Sure, there were plenty of "Hangmen" programs around, but I figured I would try a slightly different approach. Rather than construct a set of gallows and watch some poor soul dangle by the neck from a rope, I felt there had to be a less violent way to construct step-by-step graphics which would, when completed, signify the end of the game.

As you may recall from *Demon*, I stated that some very colorful graphics can be obtained by the creative use of the character strings available in the CoCo's text mode. Not only that, you could actually get nine different real colors, unlike the pseudo-colors you must create in `PMODE4` Hi-Res graphics. Add to this a black screen without the white border found in Hi-Res and you have a very nice screen to work on.

With these character strings in hand, I decided to construct a flying saucer which would be built, layer by layer, until the point of blast-off. Can anyone guess how we achieve the blast-off?

The answer is quite simple. Printing at the bottom of our text screen causes our screen to scroll upwards. Therefore, if we print at the bottom of the screen, our saucer would scroll up out of sight. The results are smooth, rapid and perfectly convincing.

Best of all, this is simple to do in BASIC. Do you have any idea how difficult it is to scroll a screen in Hi-Res graphics in BASIC? Take my word for it, it is not easy: It is memory consuming, slow and not very efficient.

The resulting version of *Tri-Planetary Hangmenoids* had a simple text title card, had about 27 words and was quite simple to play. The screen told you which letters you had used and only allowed words under 10 letters in length. If you guessed the correct word, a small alien interceptor slowly passed over the saucer and blasted it to pieces. (You see, if the saucer launched, Earth would be destroyed in this game, so you had every reason to figure out the correct secret code, as it was called.)

Therefore, in its 4K original version, *Tri-Hang* was quite nice, but nothing special. In other words, with the decline of the MC-10 market, *Tri-Hang*, like *Demon*, was just waiting for a more exciting rebirth. Your letters gave it that chance.

Your Letters

A number of letters I received after publishing *Talking Micro Math Lab* were very exciting. A number of readers were excited that I could list a program

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

that would work not only with or without speech, but also on a 16K BASIC and MC-10 with only minor modifications.

I had really come to the conclusion that no one cared about the little MC-10, but I guess I was wrong. Some people still have this machine and usually use it for their smaller children. Their big problem is finding something to load into the machine.

Still other readers were very excited about having *any* program that would talk. Apparently, there is still not too much software out there which takes advantage of the many voices our CoCo has available. Several readers requested more information on how to add speech to their own programs. (Rather than go into that in detail now, I'll save that for an upcoming month.)

Those of you who are really resourceful may be able to extract the routines to add speech to your efforts. The secret, simply put, is making all your printed text equal to A$ and then sending that string to the subroutine which creates the voice, either before or after it is printed. We will cover more on that in another "Well."

With these requests in mind, *Tri-Hang* started along a new transformation you will find listed here.

The Program

Since I have been using *Tri-Kang* on and off for the past two years in its crude form, I have always found it useful for reviewing vocabulary terms that some of my students have. Remember Bobby and Mark, the twins from a few months ago? Well, Bobby has been absolutely crazy about *Tri-Hang*, and spends quite a bit of time at home reviewing his spelling terms on the new CoCo he and Mark got for Christmas.

As I mentioned earlier, *Tri-Hang* originally would only handle a nine-letter word inserted in a `DATA` statement. Since I was doing "surgery" on the program anyway, I decided to change it so it would accept sentences instead. (You can still use single words if you want.) This would make the program more like the TV game show, *Wheel of Fortune*, where the contestants are given a screen with blank letters and spaces and they guess the letters.

Tri-Hang could be a lot more fun, and a lot more useful as an educational tool if, say, history terms or names could be entered as possible answers. (In fact, you trivia buffs will enjoy the `DATA` I have stored in *Tri-Hang*: they are all motion picture titles.)

Since we are inserting our `DATA` at the end of our program, listing the program would easily allow the user to cheat and see what words or phrases had been placed in the program. I have gotten around this by encoding all of the `DATA` in such a way as to make it appear as gibberish when listed.

When the time comes for you to create your own `DATA` to enter, I have included a routine at Line 5000 which will translate your `DATA` into the code for you to re-enter by hand later. I'll give you a few other ideas on that later.

As far as voice is concerned, this program includes the routines for use for the Radio Shack Speech-Sound Cartridge and the Spectrum Voice Pak from Spectrum Products. The Radio Shack cartridge will work in 16 or 32/64K, but the Spectrum version requires that you have at least 32K. The 16K version does not give us enough room for the program. With the Spectrum Pak, you will also have to load the machine language driver from either disk or tape.

> **"Tri-Hang *could be a lot more fun, and a lot more useful as an educational tool if, say, history terms or names could be entered as possible answers."***

The program will prompt you on how to load. When the screen says `PLEASE STAND BY`, you will have to play the tape (if that is what you are using). You will only have to load the routine in once, as following runs of the program will recognize the machine language code in place.

As always, you still have the option of using the non-talking version by selecting 'A' on the menu. You may find that the talking slows down the program. If you are in that much of a hurry, go non-talking. Still, the speech can be kind of fun.

This revised version does have directions of a kind after the new, colorful title card appears. You may proceed to the start of the game by pressing 'S' for start. If you press 'G' for greeting, the screen will slowly scroll out a message from the aliens who are seeking your help.

The Plot Thickens

As the plot for this game goes, some evil aliens are going to launch a saucer to attack Earth and other friendly worlds. An alien warns that if you can decode their secret messages, they will be able to launch their own fleet to destroy the saucer before it is completed. If you use the talking greeting, you will notice a nice added touch in which the alien apologizes for not speaking English very well.

Once you proceed to the game, you are on familiar grounds. Just like *Wheel of Fortune*, you must guess the letters to complete the message on the screen. As you use a letter, it will vanish from the top of the screen.

Guess a wrong letter, and part of the saucer will appear. If you guess too many wrong letters, the saucer will whir and blast off, giving you a score based on how many correct and incorrect letters you used to guess the messages. Be forewarned that it is not easy to get a high score since every wrong letter counts against you.

One thing you will notice with the sample `DATA` I have included here is that you only get about eight wrong tries. This may not seem like much, but when you are working with statements rather than single words, you don't need as many chances.

Still, some of you might wish to use this program only with single words (maybe some vocabulary words or terms). In this case, you would need more guesses. To allow for this, simply change the value of the variable DL in Line 740 so it is:

```
740 DL=7
```

This will allow 15 errors since it will build the spaceship much more slowly. I have found that some of my special needs students really need the 15 tries to guess a word or phrase. Others are able to get the answer in less than eight errors.

If we are using this program/game to reinforce spelling skills, it really doesn't matter if the student gets the answer easily. As you are probably well aware, there are few good spelling programs available for any computer.

Therefore, *Tri-Hang* can fill that need quite well.

In this listing, I have included 50 motion picture titles in code. If you get them all, the screen will indicate that and the game will end. Pressing ENTER will restart the game.

Non-Talking or MC-10

If you are going to type this into the MC-10, you will have to delete or alter the following lines:

```
DEL 90
DEL 130-250
DEL 660-670
DEL 700-730
DEL 760-940
DEL 5040-5050
```

These lines are not needed so we can simply delete them, or not type them in.

Add these two line changes:

```
120 MC=15360
130 GOTO490
```

The variable MC helps us correct the screen pokes for the MC-10 memory map which is different from the CoCo. You may also take the same steps if you want to have a non-talking version for the CoCo without using the menu at the beginning. The only difference is that in Line 120, you should let MC=0:

```
120 MC=0
```

Be sure Line 120 is correct for the machine you are using, or the program will crash and you will lose what you have typed in.

Regardless of which version you use, be sure the DATA statements at the beginning are accurate, especially the series of commas that you will notice. These are used to save us the trouble of typing in extra zeros. Therefore, take your time and be accurate.

Using Your Own Data

You may enter up to 59 terms in code in the DATA statements starting at Line 2000. I have included the DATA flag END in Line 5030. I have placed it here so it will not accidentally be deleted.

This flag also helps our CoCo determine exactly how many choices you have entered. If you want to delete my DATA, then type:

`DEL 2000-4999` and ENTER

If you have Color BASIC or are using the MC-10, you will have to delete all the lines between 2000 and 4999 by hand.

To make entry of my DATA easier, I have included several choices in each line, using a comma to separate them. You may find it easier to use a separate line for each entry, starting at Line 2000.

If you do not have a printer or a disk drive, you can create the code for your entries by using the command `RUN5000`. Type in your word or sentence when prompted to, making each 26 characters or fewer in length. Press ENTER and the screen will display your code, which you can either copy on paper or type directly into a DATA line.

For those of you who have a disk drive, I have included a second listing called *Encoder* which will create an ASCII file you can easily merge with *Tri-Hang*.

To use *Encoder*, select a topic name you will enter first (i.e., movies, the

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states, etc.). This will appear in a `REM` statement in Line 1990. When prompted, type in your term or statement; it will be printed in code and written to a disk file called *TERMS/BAS*.

When you have finished, type `END` and press ENTER, and the file will close. (Remember, you must have a disk in Drive 0 to run this.) To merge, `LOAD "TRI-HANG"` and then delete my `DATA` by typing:

```
DEL 2000-4999
```

Next, with your file disk in place, type:

```
MERGE "TERMS" and ENTER
```

Your coded `DATA` will now be in *Tri-Hang*. You should then resave the entire merged program under a different program name so as to not kill the original.

If you do not have a disk, you can use a cassette merge program. First, you must change the device numbers in *Encoder* from #1 to #-1 in lines 60, 110, 250 and 280. This will write the ASCII file to tape, so be sure your cassette is ready and that you press Play and Record.

If you own the cartridge version of *Color Scripsit*, you may also use it to merge from a cassette. First,

```
CSAVE"TRI-HANG",A
```

so you have an ASCII dump of the game. Be sure to delete my `DATA` first. Next, create a tape file with *Encoder* as suggested above.

Next, prepare *Color Scripsit*. First, load *Tri-Hang*. Next, without clearing memory, load *TERMS/BAS* from tape; save the entire file to tape (be sure to set the characters/line to the maximum length first). You may now reload the entire file as a BASIC program. You can resave it to tape again in BASIC if you want it to reload faster (ASCII loads very slowly from tape).

Conclusion

Whichever way you use *Tri-Hang*, whether talking or non-talking, I think you will find it a great deal of fun. Teachers and parents can have their students review important terms in a truly fun fashion.

I have also included a third listing titled *Terms* which is saved in ASCII and can either be typed into `DATA` or merged in the fashion I have suggested above. This listing has all the names of the U.S. presidents.

I used *Encoder* to create this `DATA`. Now you think up some ideas to put into `DATA`. One warning: use only letters! Do not use commas or periods or any other keyboard symbols as the game will not identify them.

		1120	107
250	165	1350	174
510	190	1570	105
700	104	1990	56
980	29	END	39

Listing 1: *TRI-HANG*

```
10 REM**************************
20 REM*      TRI-PLANETARY     *
30 REM*       HANGMENOIDS      *
40 REM*    TALKING  VERSION    *
50 REM*    BY FRED B.SCERBO    *
60 REM*  COPYRIGHT (C) 1985    *
70 REM* NORTH ADAMS, MA 01247 *
80 REM**************************
90 GOTO5040
100 CLEAR500
110 REM IF MC-10 THEN MC=15360
120 MC=0
130 CLS
140 PRINT@132,"A) NON-TALKING VE
RSION"
150 PRINT@196,"B) SPEECH-SOUND P
AK"
160 PRINT@260,"C) SPECTRUM VOICE
 PAK"
170 X$=INKEY$:IFX$=""THEN170
180 IF X$="A"THEN VP=0:GOTO490
190 IF X$="B"THEN VP=1:GOTO220
200 IF X$="C"THEN VP=2:GOTO380
210 GOTO170
220 GOSUB230:GOTO490
230 XX=&HFF00:YY=&HFF7E
240 POKEXX+1,52:POKEXX+3,63
250 POKEXX+35,60:RETURN
260 REM CREATE VOICE
270 IF VP=0 THEN RETURN
280 IF VP=1 THEN 310
290 IF VP=2 THEN 470
300 RETURN
310 GOSUB230:FORI=1TOLEN(A$)
320 IF PEEK(YY)AND 128=0 THEN320
330 POKEYY,ASC(MID$(A$,I,1))
340 NEXTI
350 IFPEEK(YY)AND128=0THEN350
360 POKEYY,13
370 FORHH=1TO900:NEXTHH:RETURN
380 IF PEEK(&H6000)=&H7F AND PEE
K(&H6005)=&H20 THEN 490
390 CLEAR1000,&H5FFF
400 PRINT@327,"(D)ISK OR (T)APE"

410 X$=INKEY$:IFX$="D"THEN420ELS
EIFX$="T"THEN440ELSE410
420 CLS:PRINT@233,"PLEASE STAND
BY";:LOADM"TRNSLATE":POKE&HFF40,
0
430 GOTO450
440 CLS:PRINT@233,"PLEASE STAND
BY";:CLOADM"TRNSLATE"
450 DEFUSR1=&H6000:DEFUSR2=&H600
5:DEFUSR3=&H6007
460 GOTO490
470 X$=USR2(A$)
480 FORHH=1TO700:NEXTHH:RETURN
490 REM START
500 CLS0:FORI=1TO32:PRINTCHR$(19
1);:NEXT
510 IF VP<>0 THEN PRINT@12,"talk
```

```
ing";
520 FORI=1056TO1343:READA:POKEI+
MC,A+128:NEXT
530 PRINT@320,"";:FORI=1TO32:PRI
NTCHR$(191);:NEXT
540 DATA35,35,34,35,35,33,32,,11
5,115,113,,113,115,114,114,113,1
13,115,113,115,115,113,115,114,1
15,115,114,114,,,114
550 DATA,42,,42,37,37,,,122,117,
117,,117,,122,126,119,117,,,117,
,117,,122,122,112,122,122,,,122
560 DATA,42,,46,46,37,36,40,126,
124,117,,117,124,122,122,117,117
,124,,117,,117,124,122,126,125,1
20,124,125,124,120
570 DATA,42,,42,37,37,,,122,,117
,115,117,,122,122,117,117,115,,1
17,,117,,122,122,112,122,,117,,
580 DATA2,,2,3,3,2,2,,2,3,3,2,3,
3,2,3,3,1,,1,1,3,3,2,2,3,3,2,1,3
,3,3
590 DATA10,,10,10,,10,14,2,10,10
,,8,10,10,10,10,,5,9,5,5,,,10,10
,10,,5,5,,,
600 DATA14,12,10,14,12,10,10,4,1
0,10,12,10,10,10,10,14,8,5,,13,5
,,,10,10,10,,5,4,12,12,13
610 DATA10,,10,10,,10,10,,10,10,
,10,10,8,10,10,,5,,5,5,,,10,10,1
0,,5,,,,5
620 DATA8,,8,8,,8,8,,8,12,12,8,8
,,8,12,12,4,,4,4,12,12,8,8,12,12
,8,4,12,12,12
630 FORI=1TO17:READA:POKE1414+I+
MC,A:NEXT:FORI=1TO19:READA:POKE1
445+I+MC,A:NEXT
640 DATA2,25,32,6,18,5,4,32,2,46
,32,19,3,5,18,2,15
650 DATA3,15,16,25,18,9,7,8,20,3
2,40,3,41,32,32,49,57,56,53
660 A$="WELCUHM TO...TRY..PLAHNN
EHTTAYRREE HANNNGMENN OYDDZ":GOS
UB270
670 T$="   PRESS hSiTART OR hGiR
EETINGS":SH=1503:GOSUB860
680 U$=CHR$(128):TW=15:DIMW(32),
NP(60),AO(60)
690 X$=INKEY$:XP=RND(6666):IFX$=
""THEN690
700 IF X$="S"THEN950
710 IF X$="G"THEN730
720 GOTO690
730 A$=".":GOSUB270
740 DL=0
750 V=12
760 CLS0:A$="      GREETINGS EAR
THLING":SH=1023:T$=A$:GOSUB860:G
OSUB270
770 A$="  ONLY YOU CAN SAVE OUR
PLANET    FROM THE DANGER WHICH
WE NOW    FACE FROM OUR ENEMIES.
 "
780 SH=SH+64:T$=A$:GOSUB860:GOSU
B270:FORI=1TO3000:NEXTI
790 SH=SH+64:A$="  YOU MUST USE
YOUR KEYBOARD      TO DECODE THE
 MESSAGE WHICH     IS SENT BY OU
R ENEMIES. "
800 T$=A$:GOSUB860:GOSUB270:FORI
=1TO3500:NEXTI:SH=SH+64
810 A$="  SELECT THE LETTERS TO
FIT IN    THE SPECIAL CODE SO YO
U CAN"
820 A$=A$+"     STOP THE SAUCER
FROM TAKING     OFF AND BLASTING
 OUR PLANET. "
830 T$=A$:GOSUB860:GOSUB270:FORI
=1TO4500:NEXTI
840 SH=SH+64:A$="  YOU ARE OUR L
AST CHANCE.   ":T$=A$:GOSUB860:G
OSUB270:FORI=1TO3500:NEXTI
850 GOTO950
860 T=LEN(T$):IFT<=32THEN910
870 FORZ=32TO0STEP-1:IFMID$(T$,Z
,1)=" "THEN890
```

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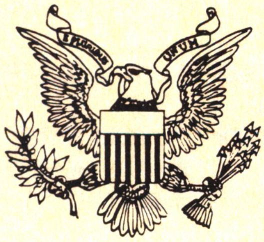

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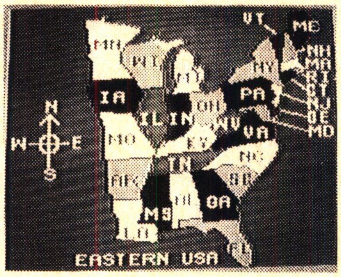
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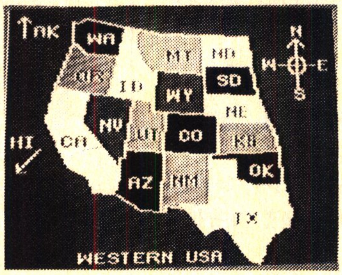
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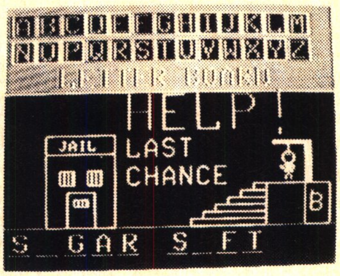
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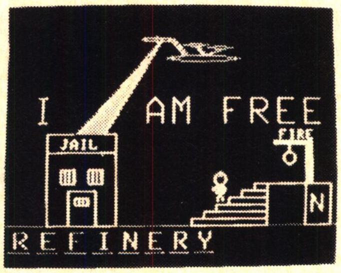
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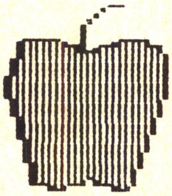
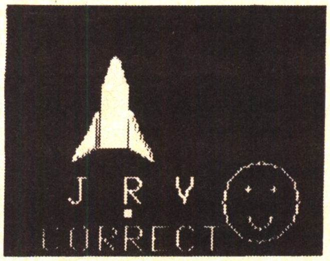




$19.95 -Tape
$24.95 - Disk

Silly Syntax

Tape - $19.95
Disk - $24.95
Disk with 62 stories - $49.95

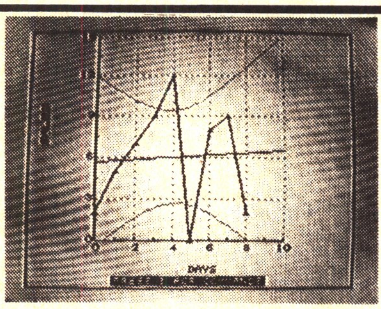
HA! HA!
NOW THAT'S <adjective>!

- Grade 5 and up
- Ideal for classroom and home use
- Increase your vocabulary
- Sharpen your language arts skills
- Improve your reading and creative writing skills
- Can also be used as a party game or family fun
- Includes user guide program and 2 stories
- Requires 16K ECB

Additional Silly Syntax story tapes available:

10 stories per tape - **$9.95 per tape**

SS 001 - Fairy Tales
SS 002 - Sing Along
SS 003 - X-Rated
SS 004 - Current Events
SS 006 - Adventure/Science Fiction
SS 007 - Potpourri



STAT GRAF

$24.95 - Tape
$29.95 - Disk

STATGRAF is a linear regression analysis program combined with a powerful but easy to use plotting/line graphing system. Designed for professional, technical, business, and educational use, among its many features are:

- Grade 10 and up
- Type titles and labels on the graph in any of three orientations
- Position titles and labels where they will not interfere with the graph
- Save data and *completed graphs* on disk or tape; display disk directory
- Transform data: logs, square root inverse, exponential, additive codes
- Calculate, display and plot residuals
- Powerful data editor: append, delete, insert, change
- Plot multiple data sets; symbols include 5 figures or *any text character*
- Calculate, display, and print regression statistics and tests of significance
- Superimpose frame, regression line, 95% confidence limits, grid
- Works easily with common machine language screen print programs (not supplied)
- Same program works with either tape or disk
- Requires 32K ECB

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P.O. Box 11932, Edmonton, Alberta T5J-3L1, (403) 421-8003.
Disk software compatible with Radio Shack DOS only.

SUGAR SOFTWARE
2153 Leah Lane
Reynoldsburg, Ohio 43068
(614) 861-0565

A complete catalog of other sweet Sugar Software products is available.

Add $1.50 per tape for postage and handling. Ohioans add 5.5% sales tax. COD orders are welcome. CIS orders EMAIL to 70405, 1374. **No refunds or exchanges.**

MasterCard VISA

```
880 NEXTZ:GOTO910
890 S$=LEFT$(T$,Z)+STRING$(32-Z,
32):GOSUB920:T$=RIGHT$(T$,T-Z):S
H=SH+32
900 GOTO860
910 S$=T$+STRING$(32-T,32)::GOSU
B920:RETURN
920 S=LEN(S$):FORI=1TOS:SS=ASC(M
ID$(S$,I,1)):SS=SS-64:IFSS=-32TH
ENSS=32ELSEIFSS=-18THENSS=46
930 POKESH+I+MC,SS:NEXTI:RETURN
940 GOTO940
950 CLS0:PRINT@232,"please"U$"st
and"U$"by";:A$="PLEASE STAND BY
WHY UL I TOOOON MY ANTENNAS":GOS
UB270:FORI=1TO60
960 READ WR$:IFWR$="END"THEN980
970 NEXTI
980 JJ=I-1:A$="EXCUUZ ME IF MY E
ENGLISH IS NOT GOOD. RE MEMBER.
I AM AN AY LEE EN.":GOSUB270
990 FOR I=1TO900:NEXTI
1000 RESTORE:FOR WR=1TO324:READ
WR$:NEXT WR
1010 FORI=1TOJJ
1020 AO(I)=RND(JJ)
1030 IF NP(AO(I))=1 THEN1020
1040 NP(AO(I))=1:NEXTI
1050 SOUND255,1:CLS0:FORI=1TO15:
PRINTCHR$(243)+CHR$(247);:NEXT:P
RINTCHR$(243)+CHR$(243);
1060 FORI=64TO92STEP2:PRINT@I,CH
R$(252)+CHR$(253);:NEXT:PRINTCHR
$(252)+CHR$(252);
1070 FORI=96TO127:PRINT@I,CHR$(2
27);:PRINT@I+64,CHR$(236);:NEXT
1080 FORI=480TO510:PRINT@I,CHR$(
175);:NEXT:POKE1535+MC,175
1090 PRINT@32,"try";:POKE1059+MC
,58:FORLL=1TO26:POKE1060+LL+MC,L
L:NEXTLL:PRINT@128,"code";:POKE1
156+MC,58
1100 GOSUB1110:GOTO1130
1110 PRINT@196,"aliens"+U$+"dest
royed";:POKE1226+MC,32:POKE1236+
MC,58:A$="...":GOSUB270
1120 AD$=STR$(AD):M=LEN(AD$):FOR
I=1TOM:N=ASC(MID$(AD$,I,1)):POKE
1237+MC+I,N:NEXT:RETURN
1130 TT=TT+1:IF TT>JJ THEN 1640
1140 Q=AO(TT):FORI=1TOQ:READB$:N
EXT:L=LEN(B$):AA$=B$:GOSUB1730
1150 J$=INKEY$:IFJ$=""THEN1150
1160 J=ASC(J$):IFJ<65ORJ>90THEN1
150
1170 LU=LU+1:QP=J-64:POKE1060+QP
+MC,32
1180 FORI=1TOL:Q=ASC(MID$(AA$,I,
1)):IFQ=J THEN1280
1190 NEXTI
1200 IF DL=7THEN1230
1210 P=P+1:ON P GOSUB1430,1470,1
500,1510,1540,1550,1560
1220 GOTO1240
1230 P=P+1:ON P GOSUB1430,1440,1
450,1460,1470,1480,1490,1500,151
0,1520,1530,1540,1550,1560
1240 A$="...":GOSUB270:A$="NO..T
HE LETTER."+J$+".WAS NOT CORRECT
":GOSUB270:IF VP=1THEN FOR KL=1T
O1400:NEXTKL
1250 IF VP=0 THEN SOUND200,1:SOU
ND20,1
1260 IFP=>8+DL THEN1570
1270 GOTO1150
1280 CR=CR+1:FORI=1TOL:IFJ=ASC(M
ID$(AA$,I,1))THENPRINT@133+I,CHR
$(J+32);:W(I)=1
1290 NEXTI:TL=0:FORI=1TOL:TL=TL+
W(I):NEXT:IFTL=L THEN1320
1300 A$="YES.."+J$+"..IS CORRECT
":GOSUB270
1310 GOTO1150
1320 A$="YES.."+J$+"..IS THE LAS
T LETTER":GOSUB270:A$="..YOU GOT
 IT":GOSUB270:A$="THE CORRECT CO
DE IS..."+AA$:GOSUB270
1330 FORI=32TO63:PRINT@I,CHR$(12
8);:NEXT:PRINT@32,"alien"+U$+"in
terceptor"+U$+"fleet"+U$+"launch
ed";
1340 POKE1061+MC,32:POKE1073+MC,
32:POKE1079+MC,32
1350 A$="OUR FLEET HAS LAUNCHED"
:GOSUB270:A$="..":GOSUB270
1360 S$=U$+CHR$(183)+CHR$(163)+C
HR$(187)
1370 FORI=3TO27STEP2:PRINT@222+I
,S$;:FORY=1TO7:PRINT@I+Y*32+224,
CHR$(197);:NEXTY
1380 FORY=1TO7:PRINT@I+Y*32+224,
U$U$;:NEXTY
1390 SOUND20,1:SOUND10,1:PRINT@2
22+I,U$U$;:NEXTI:PRINT@250,U$U$U
$U$;
1400 RESTORE:FOR WR=1TO324:READ
WR$:NEXTWR:FORI=32TO63:PRINT@I,C
HR$(128);:PRINT@I+96,CHR$(128);:
NEXT
1410 AD=AD+1:P=0:TL=0:AA$="":FOR
I=1TOL:W(I)=0:NEXT
1420 GOTO1090
1430 PRINT@455,CHR$(150);:IFDL=7
THENRETURN
1440 PRINT@472,CHR$(148)+CHR$(14
6);:IFDL=7THENRETURN
1450 PRINT@424,CHR$(150);:IFDL=7
THENRETURN
```

PIZZA
PALACE

BUT...CHECKERBOARDS ARE FOR TABLECLOTHS!

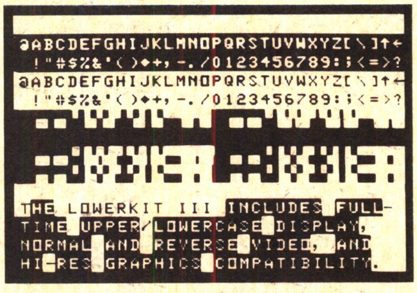
THE LOWERKIT III FROM GREEN MOUNTAIN MICRO

Still cloaking your Color Computer in a checkerboard tablecloth? Since 1981, thousands of Color Computer users have uncovered their computer by discovering the Lowerkit — the first and best full-time lowercase and special symbols generation system for your Color Computer.

Why a Lowerkit? Because uppercase-only display is a relic of the user-unfriendly past. And because you can't really read a checkerboard excuse for lowercase display. Sure, software lowercase comes with a handful of commercial programs. But software lowercase gobbles up over 6,000 bytes of your precious memory. Even if you have 64K, you'll give up 10% of it for a simple lowercase display. And software lowercase vanishes when you change programs or turn off your computer.

Take 15 minutes. Put the Lowerkit in. A Lowerkit is simple, reliable — and it's always there. You flip on your machine, and Lowerkit's bold lettering greets you. No tapes, disks or cartridges to load first. No compatibility problems; when you don't want it, you switch it off.

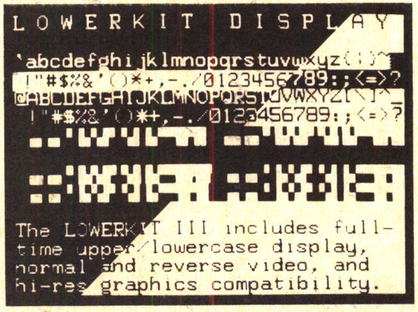
And now, the new Lowerkit III includes a reverse screen switch as well. Big, bright green letters on a black background.



```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←
 !"#$%&'()*+,-./0123456789:;<=>?

THE LOWERKIT III INCLUDES FULL-
TIME UPPER/LOWERCASE DISPLAY,
NORMAL AND REVERSE VIDEO, AND
HI-RES GRAPHICS COMPATIBILITY.
```

Original Color Computer Display



```
L O W E R K I T   D I S P L A Y

`abcdefghijklmnopqrstuvwxyz{|}~
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?

The LOWERKIT III includes full-
time upper/lowercase display,
normal and reverse video, and
hi-res graphics compatibility.
```

LOWERKIT III Display (reverse video, too)

Four years ago, the Lowerkit made history and set the standard in Color Computer lowercase. For example, game and education programs from Sugar Software have Lowerkit display options. Spectrosystems' ADOS supports the Lowerkit; so does Cer-Comp's TextPro. Cartridge Scripsit looks beautiful with a Lowerkit. Spectrum Projects, Cheshire Cat and many others have developed beautiful alternate character sets which you can download from Micronet, burn into an EPROM, and snap into your Lowerkit.

Pull the checkerboard tablecloth off your Color Computer with a **Lowerkit.** The original. The standard.

New Low Price on the Assembled Lowerkit III!

- Lowerkit III, assembled and tested, $67.50
- Lowerkit III, complete kit of parts, $49.95
- Lowerkit III, printed circuit board, $20.00

Be sure to specify Color Computer or Color Computer 2.

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Color Burner with/software, $69.95 / $56.95 kit

Micro Language Lab "Learning the 6809",$99 *(plus $3.50 shipping and handling)*

CoCoPort interface, $54.95 / $44.95 kit

RAM/ROM pack, $29.95 / $19.95 kit

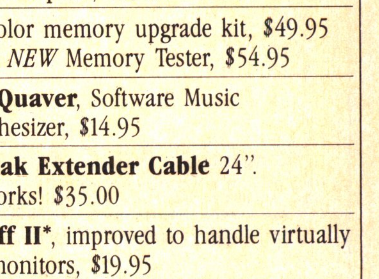
64K Color memory upgrade kit, $49.95 with *NEW* Memory Tester, $54.95

Color Quaver, Software Music Synthesizer, $14.95

Multipak Extender Cable 24". It works! $35.00

TV Buff II*, improved to handle virtually all monitors, $19.95

(Add $2.50 shipping and handling)
**Specify Color Computer or CoCo II*



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```
1460 PRINT@439,CHR$(148)+CHR$(14
6);:RETURN
1470 FORI=390TO408STEP2:PRINT@I,
CHR$(187)+CHR$(183);:NEXT:IFDL=7
THENRETURN
1480 PRINT@389,CHR$(189);:IFDL=7
THENRETURN
1490 PRINT@410,CHR$(190);:RETURN
1500 FORI=426TO437:PRINT@I,CHR$(
220);:NEXT:PRINTCHR$(216);:RETUR
N
1510 FORI=359TO376:PRINT@I,CHR$(
159);:NEXT:IFDL=7THENRETURN
1520 PRINT@358,CHR$(151);:IFDL=7
THENRETURN
1530 PRINT@377,CHR$(155);:RETURN
1540 K=327:FORI=1TO15STEP2:PRINT
@K+I,CHR$(222)+CHR$(221);:NEXT:R
ETURN
1550 FORI=298TO308STEP2:PRINT@I,
CHR$(246)+CHR$(249);:NEXT:RETURN
1560 FORI=267TO276:PRINT@I,CHR$(
195);:NEXT:RETURN
1570 PP$="":UP$="":FORI=1TO12:PP
$=PP$+CHR$(216):UP$=UP$+CHR$(212
):NEXTI:FORI=1TO32:BO$=BO$+U$:NE
XTI
1580 FORI=10TO150STEP10:PRINT@42
6,PP$;:SOUNDI,2:PRINT@426,UP$;:S
OUNDI,2:NEXTI
1590 PRINT@455,CHR$(128);:PRINT@
472,CHR$(128)+CHR$(128);:PRINT@4
24,CHR$(128);:PRINT@439,CHR$(128
)+CHR$(128);
1600 FORI=1TO10:SOUND152,1:SOUND
1,1:NEXT
1610 PRINT@480,"";:FORI=1TO16:SO
UND1,1:PRINTBO$;:NEXTI
1620 K=0:W=0:R=0:CLS0:NL=66
1630 GOTO1650
1640 CLS0:PRINT@132,"you"U$"got"
U$"them"U$"all";
1650 GOSUB1110
1660 PRINT@260,"your"+U$+"score"
+U$"is";
1670 YS=INT(CR/LU*100):IF YS=100
 THEN POKE1301+MC,49:POKE1302+MC
,48:POKE1303+MC,48
1680 IF YS=100THEN1700
1690 YS$=STR$(YS):FORI=2TOLEN(YS
$):POKE1300+MC+I,VAL(MID$(YS$,I,
1))+48:NEXTI
1700 FORI=1TO2000:NEXT
1710 IFINKEY$=""THEN1710
1720 RUN
1730 NL=1:FORG=1TOL:IF MID$(AA$,
G,1)=" "THEN POKE1157+G+MC,128:W
(G)=1:NL=NL+1:RP=1
1740 IF RP=1THEN RP=0:GOTO1760
1750 POKE1157+G+MC,42
1760 NEXTG:AA$="":FORG=1TOL:A=AS
C(MID$(B$,G,1)):IFA=32THEN1780
1770 A=A+1
1780 AA$=AA$+CHR$(A):NEXTG:RETUR
N
1990 REM START DATA
2000 DATA FNMD VHSG SGD VHMC,QDS
TQM NE SGD IDCH,SGD DLOHQD RSQHJ
DR A@BJ,BKNRD DMBNTMSDQR,MDUDQ R
@X MDUDQ @F@HM
2010 DATA ADUDQKX GHKKR BNO,ADRS
 CDEDMRD,BKN@J @MC C@FFDQ,SGHR H
R ROHM@K S@O,QNL@MBHMF SGD RSNMD
2020 DATA A@SSKD ADXNMC SGD RS@Q
R,QDUDMFD NE SGD MHMI@,SGD VQ@SG
 NE J@GM,SQ@CHMF OK@BDR,SGD MDUD
Q DMCHMF RSNQX
2030 DATA EQHC@X SGD SGHQSDDMSG,
MHFGS NE SGD KHUHMF CD@C,ENQAHCC
DM OK@MDS,@ MHFGS @S SGD NODQ@,E
HQRS LNMC@X HM NBSNADQ
2040 DATA @HQOK@MD SVN,GD@UX LDS
@K,D@RX LNMDX,Q@HCDQR NE SGD KNR
S @QJ,SGD JHCR @QD @KQHFGS
2050 DATA RHWSDDM B@MCKDR,ENNSKN
NRD,B@MMNMA@KK QTM,SGD L@M VHSG
SVN AQ@HMR
```

THE OTHER GUY'S Software

KEEP - TRAK "DOUBLE-ENTRY" General Ledger Accounting System Reg. ~~$69.95~~ — **ONLY $19.95**

"Double-Entry" General Ledger Accounting System for home or business: 16k, 32k, 64k. User-friendly, menu driven. Program features: balance sheet, income & expense statement (current & 'YTD'), journal, ledger, 899 accounts & 2350 entries on 32k & 64k (710 accounts & entries on 16k) disk only. Version 1.2 with screen printouts. For upgrade return original disk & $5.00. 1.1 Rainbow Review 9/84

"OMEGA FILE" Reg. ~~$69.95~~ — **ONLY $14.95**

Filing data base. File any information with Omega File. Records can have up to 16 fields with 255 characters per field (4080 characters/record). Sort, match & print any field. User friendly menu driven. Manual included (32k/64k disk only).

"A M T" Reg. ~~$29.95~~ — **ONLY $14.95** Rainbow Review 10/84

AMT starts where everyone else ends. AMT calculates almost any sales or purchase outcome. Total interest, total principle, total payment are all figured. AMT is not just an amortization scheduling program, but a cost forecasting and prediciton program. Useful to anyone who plans to sell or buy something with interest. (Disk Only).

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Turns 2 weeks of graphic programming into 2 hours with 'rubber band" type graphics. Generate BASIC code to use in your programs. Easy drawing and manipulation of circles, elipses, boxes, lines and ARCS. Single joystick operation with on line HELPS at all times. Allows text on the graphics screen and movement of objects on the screen. Can be used as a stand-alone graphics editor. Great for programmers and LOTS OF FUN for the novice. **Reg.** ~~$39.95~~ — **ONLY $14.95** for cassette and **$14.95** for disk. 64k with ECB required. (includes instruction manual). **GRAPHICS EDITOR**

PERSONAL INFORMATION FILE—$14.95 disk **HOME INVENTORY—$14.95 disk**

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64 K UPGRADE	$42.00	VOLKS MODEM	$59.95
FLIP & FILE 50	$19.95	RITEMAN PLUS PRINTERS	$275.00
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DATA DEFENDER 70 w/lock	$21.95	GENERIC DISKS SSDD	$14.95

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```
2060 DATA OGHK@CDKOGH@ DWODQHLDM
S,@KK NE LD,SGD VNL@M HM QDC,SGD
 RTQUHUNQR,SNO RDBQDS,SGD FNCE@S
GDQ
2070 DATA @ O@RR@FD SN HMCH@,SGD
 RNTMC NE LTRHB,SGD VHY@QC NE NY
,SGD SDM BNLL@MCLDMSR,SGD BNSSNM
 BKTA
2080 DATA RTCCDM HLO@BS,QDUDMFD
NE SGD MDQCR,RDDLR KHJD NKC SHLD
R,SGD OHQ@SDR NE ODMY@MBD,VHSGNT
S @ SQ@BD
2090 DATA SDQLR NE DMCD@QLDMS,BG
HKCQDM NE SGD BNQM,SGD RGHMHMF,S
GD @LHSXUHKKD GNQQNQ,CD@K NE SGD
 BDMSTQX
5000 LINEINPUTA$:G=LEN(A$):FORI=
1TOG:C=ASC(MID$(A$,I,1))-1:IFC=3
1THENC=32
5010 PRINTCHR$(C);:NEXT
5020 END
5030 DATA END
5040 PCLEAR1
5050 GOTO100
```

Listing 2: *ENCODER*

```
10 '****************************
20 '*   TRI-HANG DATA ENCODER  *
30 '*     BY FRED B.SCERBO     *
40 '*    COPYRIGHT (C) 1985    *
50 '****************************
60 OPEN"O",#1,"TERMS/BAS"
70 A=1990
80 CLS
90 PRINT"ENTER TOPIC: ";:LINEINP
UT A$
100 A$="1990 REM "+A$
110 PRINT#1,A$
120 CLS
130 PRINT"TYPE IN YOUR ENTRY BEL
OW."
140 PRINT"TYPE <END> TO STOP"
150 Z=1
160 PRINT:PRINT"ENTRY #";Z
170 A=A+10:Z=Z+1
180 W$=STR$(A):W=LEN(W$):W$=RIGH
T$(W$,W-1)
190 LINEINPUT A$
200 G=LEN(A$):FORI=1TOG:C=ASC(MI
D$(A$,I,1))-1:IF C=31THENC=32
210 P$=P$+CHR$(C):NEXT
220 IF P$="DMC"THEN280
230 P$=W$+" DATA "+P$
240 PRINTP$
250 PRINT#1,P$
260 P$=""
270 GOTO160
280 CLOSE#1
```

Listing 3: *TERMS*

```
1990 REM PRESIDENTS
2000 DATA FDNQFD V@RGHMFSNM
2010 DATA INGM @C@LR
2020 DATA SGNL@R IDEEDQRNM
2030 DATA I@LDR L@CHRNM
2040 DATA I@LDR LNMQND
2050 DATA INGM PTHMBX @C@LR
2060 DATA @MCQDV I@BJRNM
2070 DATA L@QSHM U@M ATQDM
2080 DATA VHKKH@L G@QQHRNM
2090 DATA INGM SXKDQ
2100 DATA I@LDR ONKJ
2110 DATA Y@BG@QX S@XKNQ
2120 DATA LHKK@QC EHKKLNQD
2130 DATA EQ@MJKHM OHDQBD
2140 DATA I@LDR ATBG@M@M
2150 DATA @AQ@G@L KHMBNKM
2160 DATA @MCQDV INGMRNM
2170 DATA TKXRRDR FQ@MS
2180 DATA QTSGDQENQC G@XDR
2190 DATA I@LDR F@QEHDKC
2200 DATA BGDRSDQ @QSGTQ
2210 DATA FQNUDQ BKDUDK@MC
2220 DATA ADMI@LHM G@QQHRNM
2230 DATA FQNUDQ BKDUDK@MC
2240 DATA VHKKH@L LBJHMKDX
2250 DATA SGDNCNQD QNNRDUDKS
2260 DATA VHKKH@L S@ES
2270 DATA VNNCQNV VHKRNM
2280 DATA V@QQDM G@QCHMF
2290 DATA B@KUHM BNNKHCFD
2300 DATA GDQADQS GNNUDQ
2310 DATA EQ@MJKHM QNNRDUDKS
2320 DATA G@QQX SQTL@M
2330 DATA CVHFGS DHRDMGNVDQ
2340 DATA INGM JDMMDCX
2350 DATA KXMCNM INGMRNM
2360 DATA QHBG@QC MHWNM
2370 DATA FDQ@KC ENQC
2380 DATA IHLLX B@QSDQ
2390 DATA QNM@KC QD@F@M
```

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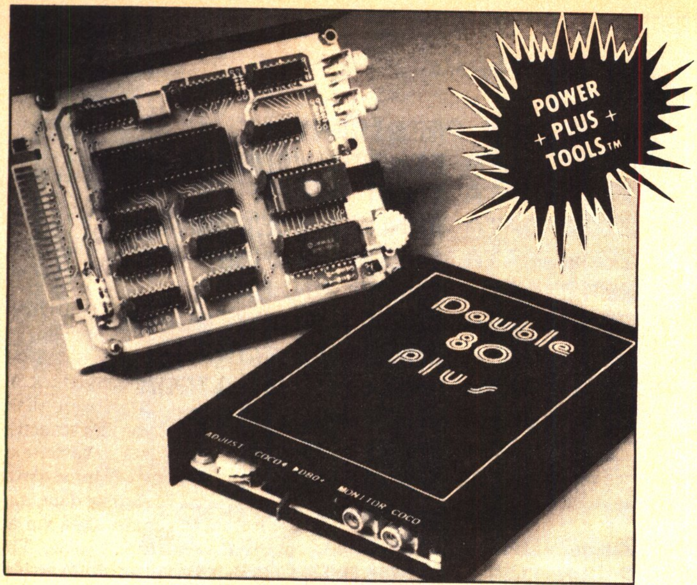
PRINTER & DISK



HARDWARE

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MINI MOUTH — Now get sound from your mute monitor. Plugs right in, nothing to solder $24.95

COLOR POWER II — This plug in CP/M board will allow you to use thousands of CP/M programs $329.00

MINI-MODEM — 300 BAUD, Originate/Answer Full Duplex, Direct Connect . $79.95 (Save $10.00 when you buy one of our terminal programs and a modem)

DISKS — DISKS — DISKS — DISKS — DISKS
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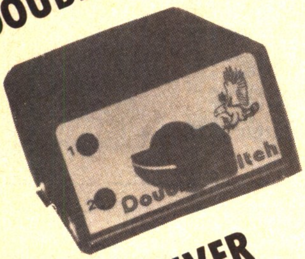
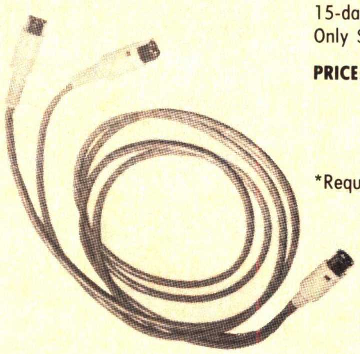


DOUBLE CABLE



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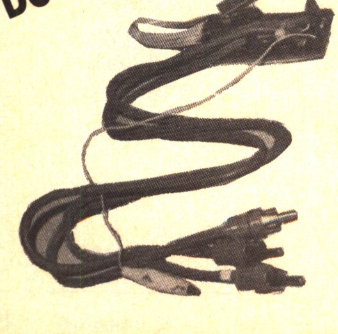
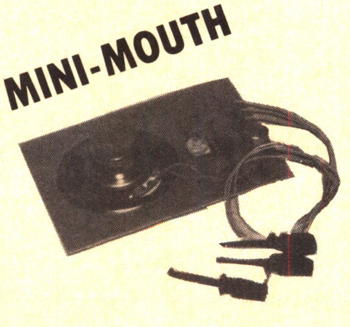


MINI-MOUTH



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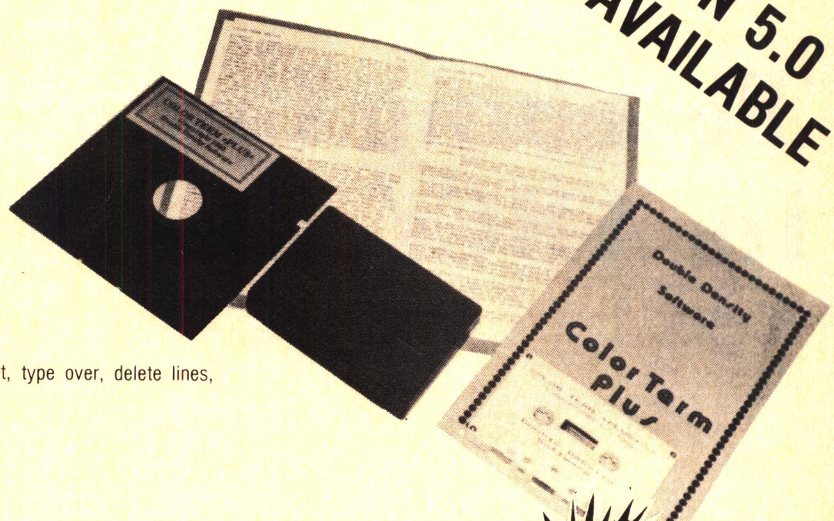

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Teaching CoCo Its ABCs

By Joseph Kolar
Rainbow Contributing Editor

The `DRAW` statement is central to the CoCo's graphics capability and it has numerous uses. Not only can designs and drawings be created, but alphabets may be worked up.

Every beginner yearns to master this versatile feature of the Color Computer. After all, there isn't much sense in buying a Color Computer if its graphics capabilities aren't eagerly utilized.

This month we will work with `DRAW`, so crack open your manual and review the chapter on this statement.

The object of this tutorial is to present four different-sized letters of the alphabet. They will be variations of a theme and offer practice in creating letters, hopefully giving you confidence as you progress and add this command to your portfolio of useful tools.

First, look at Figure 1. You may want to use graph paper, which is ideal to lay out the form of each letter and to see a visual track of each letter.

The sizes of the letters will be 6 by 4 (six units high and four units wide), 8 by 4, 10 by 4 and 10 by 5. The simplest and easiest created form of the letters presented will be demonstrated.

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

Key in lines 0, 10, 15 and 100 from Listing 1; study Line 20. CoCo is told what to `DRAW` from what is enclosed within the quotation marks. Before we tell it what to draw, we give it instructions regarding size, S8 in this case, and the starting point, BM50,40 which indicates that it should begin 50 units from the left margin and is separated by a required comma 40 units from the top. You could also include the color C1, but since it is in the default mode CoCo understands that C1 is requested.

Figure 2 shows the four letters that are created, one after the other, in the balance of Line 20. Each letter is separated by a space for your convenience.

Now, key in `20 Draw"S8BM50,40`. Compare the smallest 'S' with the directions to create it. Remember, each letter will be created beginning in the lower left-hand corner; R4U3L4U3R4 creates it. Here is how it goes: draw four units to the right of the starting location (R4), continue up three units (U3), turn left and go four units (L4), go up three more units (U3), and finally, right for four units (R4).

This brings us to the upper right-hand corner of the 6 by 4 matrix. We expect to separate each letter with three spaces and return to a position that will bring us to the lower left-hand starting position of the next letter which is BR3BD6. We do not want any lines drawn. The 'B' placed before R3 and D6 instructs CoCo to move right three units without drawing a visible line, then move down six units without drawing a visible line.

You may add the closing quotation mark and `RUN`. You should have an 'S' on the screen identical in form to the 6 by 4 matrix letter in Figure 2. It is a simple but adequate 'S.'

Depress the BREAK key, change the closing quotation marks to a space and key in `R4U4L4U4R4`. This 'S' is taller, but has the same width using an 8 by 4 matrix. Naturally, it has a slightly different set of instructions. Now key in `BR3BD8`. Since we want to get to the starting position of the third 'S,' we must move right three units and down eight units without a visible line. Add the required closing quotation mark and run.

BREAK and change the closing quotation mark to a space. Key in `R4U5L4U5R4` to create an even taller 'S' and `BR3BD10` to allow for the intervening space between letters and to return to the lower left-hand position of the fourth letter. Add the quotation mark and run. Compare the tall, skinny letter with the third 'S' in Figure 2 (10 by 4 matrix).

Now BREAK and change the closing quotation mark to a space and key in

R5U5L5U5R5, add the quotation mark and run.

Since this is the last 'S' of the group and no further letters will follow, it is not necessary to reserve a space between words or advance to a starting location.

Refer to Line 30. Note that since we do not intend to change the size (S8), we do not add it any further. CoCo will continue using the same scale until new instructions are given.

Proceed as you have done to create and study the 'S' letters in Line 20.

We will create the letter 'A' with the crossbar in the middle. If you plotted out the directional instructions in Line 30, you will notice that the left side was created bottom to top: the top added left to right, down half the length of the right leg, the crossbar was added, and finally, the bottom half of the right leg was created.

Note that the crossbar of the 'A' was created using NL4 in the first three examples and NL5 in the last case. After we created the top half of the right leg, NL4 told CoCo to draw four spaces to the left and return.

You could say that 'N' means after going the indicated distance, which is L4, return in the opposite direction the same number of units, which is R4. Thus, NL4 is equivalent to L4R4. It is customary to use NL4 instead of L4R4, and NE10 in place of E10G10.

You could just as easily create the first 'A' in Line 30 using U3NR4U3R4D6BR3, but the important thing is to be consistent. Use the same route all the time and as you develop your skill, you will mentally envision the route you must take to create a particular letter.

Note how conveniently each 'A' ended at the base line. All that was required was to add the space between letters. Make it a practice to add the space and any move to return to the starting position of the next letter at the end of the letter completed. This way, you will be ready to draw the next letter.

In Line 40, we will create the letter 'N.' Here is a step-by-step description of the directions traversed to make the first 'N': draw up five spaces (D5); go up one space and return (NU), equivalent to (UD); go four spaces diagonally at an angle of 135 degrees (F4); go up five spaces and return (NU5); go down one space and add the space between letters (DBR3).

Do each 'N' separately and note where the diagonal line is attached to the left leg of the 'N.'

Although this is the logical route to follow to create the 'N,' you could use U6BR4D5NH4DBR3. Plot it on graph paper and note that you made the left leg which is U6; skipped over to the

Figure 1

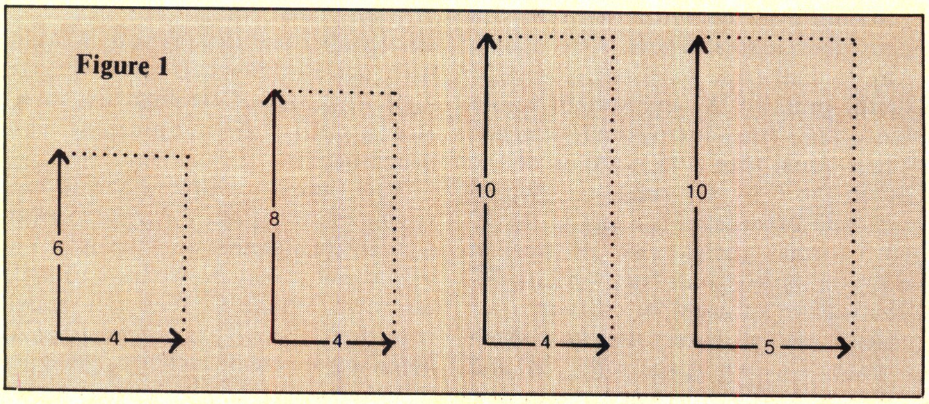
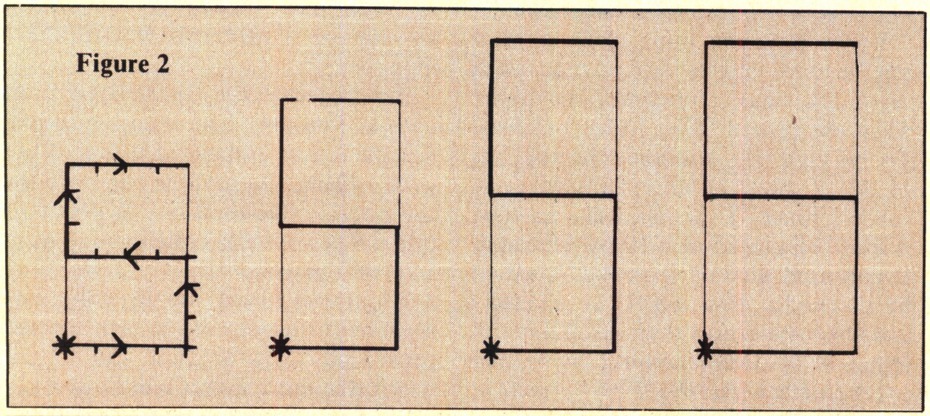


Figure 2



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top of the right leg which is BR4; went down five spaces which is D5; made a diagonal 315 degree line for four spaces and returned which is NH4 (equivalent to H4F4); down one space which is 'D' to complete the leg; and added the ending spaces which is BR3.

In Line 50, we create the difficult letter 'X.' Let me talk you through the first 'X.' Up one space, 'D'; two spaces in a diagonal, 45 degree direction (up and to the right), E2; two spaces in a diagonal 315 angle direction (up and to the left), H2; up one space, 'D'; skip over to the right side, BR4; down one space, 'D'; two spaces in a diagonal 225 degree angle (down and to the left), G2; two spaces in a diagonal 135 degree direction (down and to the right), F2; down one space, 'D'; and the usual spacer, BR3.

Note that the 10 by 5 matrix 'X' posed a problem. Crossing the middle is simple when the width is an even number, but when the width is an odd number, a new method must be found.

Let me talk you through this problem case: up three spaces, U3; diagonally (up to the right), E5, which crosses over to the right leg; up two spaces to the top, U2; cross over to the top of the left leg, BL5; down two spaces, D2; diagonally five spaces (down to the right), F5; and down three spaces to complete the left leg, D3.

This brings us to the discovery that you must make compromises when you plan your letters. There is no simple way to make the diagonal of the 'N' or the cross of 'X' and remain within the format. You must make adjustments, either equal tops and bottoms of the 'X' in the 6 by 4 format, or unequal tops and bottoms of the legs in the 10 by 5 format (height two on top and three on the bottom). Later, in Line 70, you will see a variant 'N' created.

Also, not all letters will fit a given format. 'I' is one space wide. 'M' and 'W' must be wider than normal, usually two spaces wider to look unsquashed.

Sometimes you must make a letter one or two spaces wider than your regular format, sometimes narrower! Take the case of 'T' in 10 by 5 format. To be properly centered, the top bar of the 'T' must be an even number of spaces. Since 'T' is relatively narrow, it must be placed in a 10 by 4 format. If you used a 10 by 6 format, it would be too wide. Also, an 'L' is generally one space narrower than normal-width letters (6 by 3 rather than 6 by 4), and some people prefer the 'F' to be narrow.

The point is that of the four formats demonstrated, each has unique planning problems. You may make variations in the shape of the letters to suit yourself. In lines 60, 70 and 80, you will find that other popular forms of the letters 'S,' 'A' and 'N' are acceptable.

Notice that beginning with Line 60, all the letters will begin where the last letter ended. If the last letter ended at the top, the following letter will begin at the top. If it ends at the bottom, the next letter will begin at the bottom.

This is a good technique to learn and when creating words, as in lines 200 and 210, it enables you to draw in a fashion analogous to writing a word in a cursive manner by hand. There is an even flow from one letter to the next. On a piece of graph paper, make copies of the letters created in lines 60 through 90 to see the "flow" from one letter to the next.

In Line 90, 'R' is created. Notice how contorted the 10 by 4 formatted 'R' looks with the bent foot. This could have been eliminated by making the body of the 'R' longer with U10R4D6L4F4. The only thing is that I didn't like it; you may prefer it this way.

The reason four formats are presented is to give you practice in forming each letter and to solve the problems of differing heights and widths. Once you recognize the problems and constraints of a particular format, you can create an alphabet that pleases you. Working with such an alphabet is easy and makes light work out of creating text in Hi-Res graphics to supplement your programs.

Now that you know what you have to contend with, you are urged to create a complete alphabet on your own. You might ask, "Why do we have to make our own alphabet? Why not merely copy one?" Copying is not creating! An alphabet you create will be original and reflect your personality and taste. Just as your handwriting is "yours," so should be your own personalized alphabet.

Now, delete the apostrophe from Line 15 and RUN. The resulting display has the letters connected just as if you were writing. On graphic paper, follow the direction of the flow. If you want practice, create the same display using a 10 by 5 matrix.

Experiment and create your own alphabet using one of the four formats presented. The smaller the matrix width, the more letters will fit in a row on the screen; the smaller the height, the more rows you will be able to squeeze on a display page.

Once you develop and settle on a particular alphabet, it won't be long before you commit it to memory and it will be at your command when needed. It will be a welcome addition to your beginner's repertoire.

Next month, you will be able to compare your work with a simple 6 by 4 matrix alphabet, plus numerals.

(If you key in and save this month's graphics, which use the psuedo-colors, you will find that on a cold start CoCo will panic! You will see the text, but not as intended. Run it and look it over, then BREAK and run again.)

Listing 1: *LETTERS*

```
0 'LISTING1
10 PMODE4,1:PCLS:SCREEN1,1
15 'GOTO200
20 DRAW"S8BM50,40R4U3L4U3R4BR3BD
6 R4U4L4U4R4BR3BD8 R4U5L4U5R4BR3
BD10 R5U5L5U5R5"
30 DRAW"BM50,80U6R4D3NL4D3BR3 U8
R4D4NL4D4BR3 U10R4D5NL4D5BR3 U10
R5D5NL5D5"
40 DRAW"BM50,120U5NUF4NU5DBR3 NU
U6NU2F4NU6D2BR3 U8NU2F4NU6D4BR3
U8NU2F5NU7D3"
50 DRAW"BM50,160UE2H2UBR4DG2F2DB
R3 U2E2H2U2BR4D2G2F2D2BR3 U3E2H2
U3BR4D3G2F2D3BR3 U3E5U2BL5D2F5D3
"
60 DRAW"BM150,40R4U4L4U2R4BR3 BU
2NR4D3R4D5NL4BR3 R4U6L4U4R4BR3 N
R5D4R5D6NL5"
70 DRAW"BM150,80U6R4D4NL4D2BR3 U
8R4D5NL4D3BR3 U10R4D6NL4D4BR3 U1
0R5D6NL5D4"
80 DRAW"BM150,120U6F4ND2U4BR3 BU
2DND7F4NU5D3BR3 U9NUF4ND5U5BR3 D
ND9F5NU6D4"
90 DRAW"BM150,160U6R4D3L3NLF3BR3
 U8R4D4L4F4BR3 U10R4D5L4F4DBR3 U
10R5D6L4NLF4"
100 GOTO100
200 DRAW"S12BM60,110U6R4D4L2NL2F
2BR3 U6R4D4NL4D2BR3NU6BR3 U5NUF4
NU5DBR3 U6R3D2NL3RD4NL4BR3 NR4U6
R4D6BR3 NU6R3NU4R3NU6"
210 DRAW"BM100,70BR2U6NL2R2BR3 D
3ND3R4NU3D3BR3 NR4U3NR3U3R4"
500 GOTO500
600 '***TO RUN THE 2ND PART OF
THE DISPLAY, EDIT <'> OUT OF
LINE 15.
```

Bonus listing: *COLORS*

```
0 'RAINBOW
5 PCLS
11 PMODE2:PCLS3:PMODE3:SCREEN1,1
20 A$="U8R4D4L4F4BR3 U8R4D5NL4D3
BR3 NU8BR3 U6NU2F4NU6D2BR3 NR4U5
NR3U3R3D3RD5BR3 NR4U8R4ND8BR3 D8
R3NU5R3U8"
22 FOR X=1TO2
25 DRAW"C1S16BM36,151"+A$:DRAW"B
M36,61"+A$
26 FOR Z=1 TO 100:NEXT
27 DRAW"BM35,150"+A$:DRAW"BM37,6
2"+A$
28 FOR Z=1 TO 100:NEXT
29 DRAW"BM34,149"+A$:DRAW"BM38,6
3"+A$
30 FOR Z=1 TO 100:NEXT
31 DRAW"BM33,148"+A$:DRAW"BM39,6
4"+A$
32 FOR Z=1 TO 900:NEXT
33 DRAW"C0BM33,148"+A$:DRAW"BM39
,64"+A$
34 FOR Z=1TO80:NEXT
35 DRAW"BM34,149"+A$:DRAW"BM38,6
3"+A$
36 FOR Z=1 TO 70:NEXT
37 DRAW"BM35,150"+A$:DRAW"BM37,6
2"+A$
38 FOR Z=1TO60:NEXT
39 DRAW"BM36,151"+A$:DRAW"BM36,6
1"+A$
40 FOR Z=1 TO 600:NEXTZ,X
100 GOTO11
```

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Corrections

"Like Sands Through The Hourglass" (January 1985, Page 156): Mary Crooks tells us there is a non-functional loop in this program. These changes will remove it.

Delete Line 200 and add the following:

```
240 CIRCLE(126,152),15,,.75,.50,
1:PAINT(126,143),1,1
250 NEXTT:CIRCLE(126,152),19,,.7
5,.50,1:PAINT(126,140),1,1
```

"FILECOPY" (February 1985, Page 242): Mike Knight of Wallowa, Oregon wrote to tell us this program has a bug that prevents it from reading the last line of a directory when you try to copy the directory. He suggests changing the statements after Line 110 as follows:

Delete:

```
110 READ #DISK,INDATA
    IF EOF(#DISK) THEN
    GOTO 150
    ENDIF
```

Insert:

```
WHILE NOT(EOF(DISK#)) DO
READ #DISK,INDATA
```

Change `GOTO 110` to:

```
ENDWHILE
GOTO 150
```

"CoCo Becomes The Paymaster" (March 1985, Page 58): Dennis Weide tells us that there is a minor bug in the *EMPLOYER* program. He suggests adding this line:

```
12950 NEXT X
```

Hint . . .

EDIT Mode Subcommands

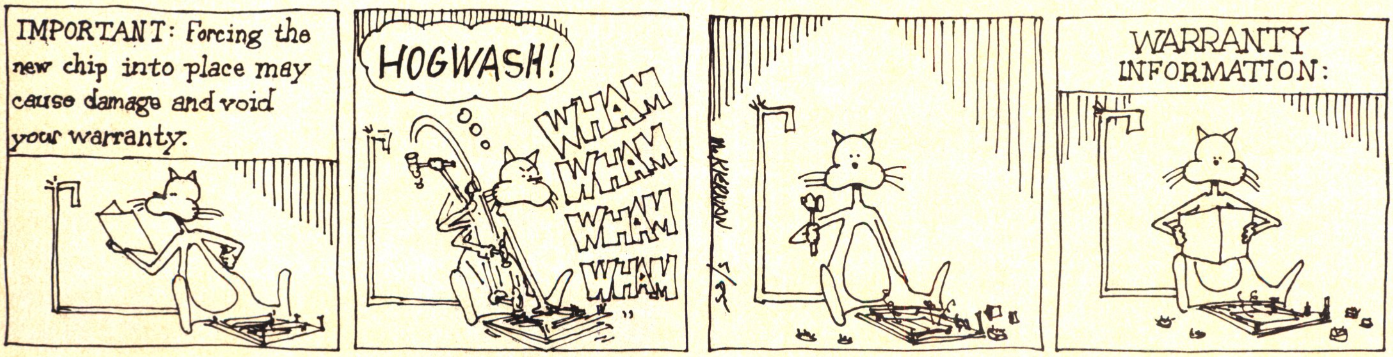
Here's a complete list of the editing subcommands in Extended Color BASIC. For some reason, a few of these were left out of the Extended BASIC manual.

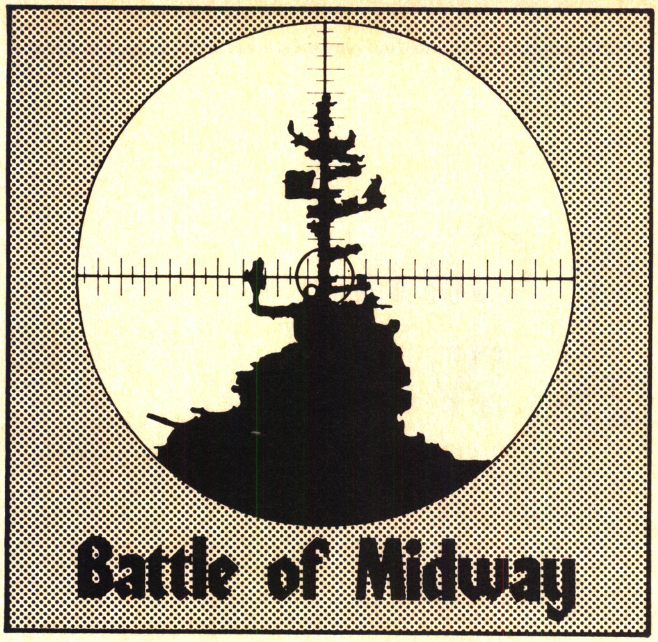
ENTER	Records all changes and returns to command mode
n SPACEBAR	Moves 'n' spaces forward
n left-arrow	Moves 'n' spaces back
SHIFT up-arrow	Escapes from 'X,' 'I' and 'H' insert modes
L	Lists rest of line, places cursor at beginning
X	Moves cursor to end of line and enters insert mode
I	Enters insert mode at current cursor position
A	Cancels changes already made, places cursor at beginning of line
E	Exits edit mode with changes saved
Q	Quits edit mode without changes
H	Hacks off all characters after cursor, enters edit mode
nD	Deletes specified number of characters at cursor. ('D' by itself deletes one character)
nC	Changes specified number of characters at cursor. ('C' by itself changes one character.) 'C' is followed by the new characters you want to put in.
nSc	Searches for the nth occurrence of character 'c.'
nKc	Deletes all characters up to the nth occurrence of character 'c.'

You can find complete details in BASIC Chapter 9 of Radio Shack's *Model III/4 Operation and BASIC Language Manual* (catalog number 26-2112) or in the Model I *Level II BASIC Reference Manual* (catalog number 26-2102). The CoCo edit subcommands are the same.

— Ed Ellers

CoCo Cat


IMPORTANT: Forcing the new chip into place may cause damage and void your warranty.
HOGWASH!
WHAM
WHAM
WHAM
WHAM
WARRANTY INFORMATION:



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Ark Royal's masterpiece game of naval strategy of perhaps the most important battle in the history of the United States Navy. Hi Res graphics, 75% machine language allows player to control as many as 41 separate units on the screen at one time. Command Task Forces 16 & 17 as they play cat and mouse with the Japanese fleet. Maneuver the Hornet, Yorktown and Enterprise into the best position. Set courses and launch search and attack aircraft then hope for the best. Find the enemy fleet, then pick the targets: Akagi, Soryu, Kaga, Yamato and others in this historically accurate game. Relive history, Admiral, and it won't be any easier this time around. Anchors Aweigh.

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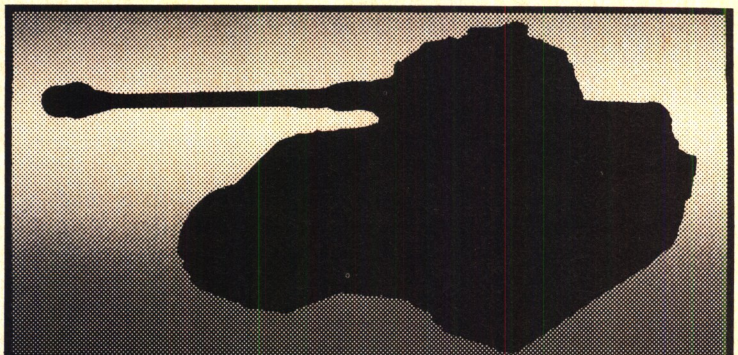

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By George Firedrake and Karl Albrecht

Most characters can perform certain skills at the 100 percent level. These skills include normal, everyday activities such as hearing, seeing, walking and talking. However, when a character tries to concentrate on a single skill, it takes on a special function that may or may not work successfully every time it is used. Thus, walking becomes jumping, dodging or moving quietly; seeing becomes the ability to spot a hidden object; talking becomes the ability to tell a story, speak a foreign language or sing.

Even natural skills can become more difficult under adverse conditions. Seeing is natural, but more difficult in poor light; hearing is easy, but not when there is high background noise.

Below are some small scenarios that will help you think about your character from her point of view. Put your character in these situations and think about how she will succeed in using a natural, everyday skill.

Your character is conversing, in normal tones, with another character:

1) In a quiet room.
2) On a motorcycle, roaring down the freeway at 60 mph.
3) In a tent amidst a light rainstorm.
4) On horseback, galloping across the plains of Rohan.
5) In a tavern that features the best of dark age rock, "Morgana and the Madrigals."

Your character is reading a book:

1) In a quiet, well-lighted room.
2) In a smoke-filled tavern, dimly lit by flickering oil lamps.
3) While traversing the Sahara Desert on camelback.
4) By candlelight in a tent amidst a crashing thunderstorm.
5) While hanging upside down. Your character has been caught in a tree-snare.

Your character is in a tavern, trying to overhear a conversation:

1) At the next table.
2) Two tables away.
3) Halfway across the room.

Your character is walking:

1) On smooth, level ground.
2) Down a gentle slope.
3) Up a gentle slope.
4) Up a very steep slope.
5) Down a very steep slope.
6) On ice.
7) On a narrow log 100 feet above ground.
8) In two feet of mud.

Of course, if you choose to, you may run a character who cannot perform a common, natural ability. You may want to run a blind, deaf or mute character, or a character whose ability to walk is less than 100 percent. The choice is yours.

And Some Things Not So Well

In previous episodes, you have met Aloysious Anonymous and other characters. Now, and in the next few times, we will describe some of their skills and give success percentages for a character like Aloysious who is average or near average in every one of the seven characteristics. That is, every characteristic is in the range of nine to 12.

Aloysious

STR	10	POW	10
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SIZ	10	CHA	9
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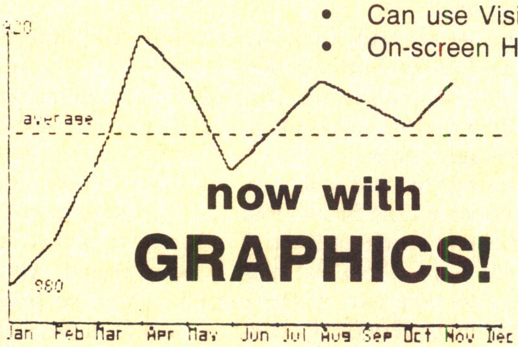

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We join Aloysious on a warm, clear spring day when he is 16 years old. He is traveling afoot from his village to the town of Baldvu in Wundervale. Along the way he will have occasion to demonstrate the abilities we want you to know about.

LISTEN (Success percentage: 45%)

This is the ability to concentrate on hearing something that would not otherwise be heard. Your character makes a special effort to listen. Success percentage is 45. Roll the percentile dice. If they show 45 or less, success! If they come up 46 or more, failure.

Success: Roll 45 or less on the percentile dice
Failure: Roll 46 or more on the percentile dice

Or use your CoCo to simulate the percentile roll:
A digit die (DD) is a 10- or 20-sided die whose faces are numbered 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

D100 is a percentile roll, with numbers 00 to 99. To make a percentile roll, use one DD (digit die) and roll it twice. The first roll is the *tens* digit; the second roll is the *ones* digit. If you roll a '3' the first time and a '7' the second time, the number is 37.

Aloysious is walking along a path in a forest. The GameMaster knows that a very interesting waterfall is off to the right. If Aloysious does not occasionally stop to listen, he'll never know about these things.

Aloysious decides to stop and listen. Roll the percentile dice — they show 29; a successful roll. The GameMaster says, "You hear the sound of water and a faint moaning sound off to the right of the path."

Decision time: Does Aloysious investigate the sound, go find the waterfall and embark on that adventure? Or does he continue on his way, to perhaps a different adventure?

Well, Aloysious is eager to be on his way to Baldvu, a town he has yet to see. He notes a landmark or two and promises himself that someday he will return to investigate the sound.

Now, suppose the dice had come up 46 or more. In this event, Aloysious failed to hear anything. The GameMaster says, "You hear nothing unusual." Aloysious continues on his way, unaware of the waterfall and the hidden moaning cave.

You might roll 00, a fumble. In this case, something undesirable might happen to Aloysious. The GameMaster decides. Perhaps a bee flies into Aloysious's ear and stings him. Ouch! He continues on his way in some pain, unaware of the waterfall and cave.

Remember: If you are playing Aloysious, you decide when he LISTENs. Tell the GameMaster, "Aloysious stops and listens."

SPOT HIDDEN ITEM (Success percentage: 25%)

Yes, hidden items are hard to spot. When he really tries, Aloysious will see a hidden item about once in four tries. Of course, if he doesn't consciously try, he'll never spot a hidden item. If he does try:

Success: Roll 25 or less on the percentile dice
Failure: Roll 26 or more on the percentile dice

Same forest, same path. Aloysious hears a sudden loud noise to the left, then silence. He stops and peers intently into the underbrush.

Roll 25 or less: He sees the quiet, hidden deer
Roll 26 or more: He doesn't see the deer

A lucky throw! The dice say 24; Aloysious sees the deer.

MOVE QUIETLY (Success percentage: 25%)

This ability is important if you are a predator sneaking up on your prey. It is even more important if you are the prey sneaking away from a predator!

Success: Roll 25 or less on the percentile dice
Failure: Roll 26 or more on the percentile dice

Aloysious tries to get closer to the deer. Unfortunately, we roll 27; the deer hears him and bounds away.

Next time, Aloysious continues his journey through the forest, trying out other of his skills such as HIDE, JUMP and SWIM.

Play-By-Mail Games

If you have never played a role-playing game and want to begin playing, try a play-by-mail game. Anyone can learn to play by playing — no previous gaming experience is required.

Flying Buffalo, Inc. created the play-by-mail industry. We are playing three of their games, *STARWEB, HEROIC FANTASY* and *FEUDAL LORDS*. We will report on our progress in "GameMaster's Apprentice." If you want to play, begin by getting the rules from Flying Buffalo, Inc., Dept. GMA, P.O. Box 1467, Scottsdale, AZ 85252-1467. Here are the prices: *STARWEB* $2, *HEROIC FANTASY* $1 and *FEUDAL LORDS* $1.

There is a set-up fee to enter a game and a turn fee each time you send in a move. It's all there in the rules.

Heroic Fantasy

Last time we reported that Sheri, Tindil, Aikhoun, Frona and Jonjari left the Entrance Room through the west door and found themselves in the Dusty Room. Zamora, Leiko, Mariko and Steffi remained in the Entrance Room and prepared magic spells.

On entering the Dusty Room, our adventurers encountered a "monster," the Brown Bear, and noted three potions. We panicked and ordered Sheri, Tindil and Jonjari to attack the Brown Bear. More rationally, we directed Aikhoun and Frona to take two of the potions. We also told our four characters still in the Entrance Room to move through the west door into the Dusty Room. Well, here is what happened next, as reported by Flying Buffalo's computer.

Name	Char	Orders
Sheri	27	A1OM
Zamora	57	XOW :<Speech>
Tindil	139	A15M :<Speech>
Leiko	141	XOW

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Aikhoun	142	TOP117 :<Speech>
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Jonjari	191	A20M :<Speech>

Dusty Room

Doors: North 5, East 25, South 3, West 3.
Monster: Brown Bear, takes eight hits, attacks Frona (C146), P204: Potion

The Brown Bear is wounded and attacks Frona. What if we did *not* attack the Brown Bear? Next time we play, we will see what happens if we try hard to play non-violently. Can you negotiate with a Brown Bear? Can you quietly ignore it?

All of our characters are now in the Dusty Room. Here is what is happening to each and every one.

* (C27) Sheri: female Human Fighter, attacks (10) Brown Bear.
Str=15 Con=30 Exp=20 Prizes=1
P443: Healing Potion (Use me)=100

* (C57) Zamora: male Human Magic-User, arrived from East.
Str=10 Con=30 Exp=5 (Has Fireball)
Prizes =1 "TA DA!"
P511: Healing Potion (Use me)=100

* (C139) Tindil: male Elf Fighter, attacks (15) Brown Bear.
Str=25 Con=25 Exp=25 Prizes=1 "Charge!"
P330: Healing Potion (Use me)=100

* (C141) Leiko: female Elf Magic-User, arrived from East.
Str=20 Con=25 Exp=25 (Has Blast) Prizes=1
P404: Healing Potion (Use me)=100

* (C142) Aikhoun: male Hobbit Fighter, takes (0) Strength Potion.
Str=5 Con=15 Exp=10 Prizes=2 "It's mine!"
P117: Strength Potion (Use me)=100
P186: Healing Potion (Use me)=100

* (C146) Frona: female Hobbit Fighter, takes eight hits, takes (0) Healing Potion.
Str=5 Con=7 (15) Exp=10 Prizes=2
P39: Healing Potion (Use me)=100
P145: Healing Potion (Use me)=100

* (C153) Mariko: female Hobbit Magic-User, arrived from East.
Str=4 Con=15 Exp=5 (Has Fireball) Prizes=1
P197: Healing Potion (Use me)=100

* (C163) Steffi: female Hobbit Magic-User, arrived from East.
Str=4 Con=15 Exp=5 (Has Sleep) Prizes=1 "Uh oh!"
P266: Healing Potion (Use me)=100

* (C191) Jonjari: male Dwarf Fighter, attacks (20) Brown Bear.
Str=30 Con=40 Exp=30 Prizes=1 "Take this!"
P403: Healing Potion (Use me)=100

Frona took eight hits! What should we tell her to do? Meanwhile, back in the Entrance Room.

Entrance Room

Doors: North 25, East 25, South 25, West 25.

- (C76) Bacchus: male Hobbit, arrived from East.
"Follow us! Safety in numbers y'know."

- (C111) Lotus Eater: male Human, arrived from East.
"There's a bunch of unfriendly people to the east of here."

Characters who left here:

— (C18)	Cronus: male Troll, moves North.
— (C29)	Hecate: female Elf, moves North.
* (C57)	Zamora: male Human Magic-User, moves (0) West.
— (C95)	Mage Crowley: male Human, moves North.
* (C141)	Leiko: female Elf Magic-User, moves (0) West.
* (C153)	Mariko: female Hobbit Magic-User, moves (0) West.
* (C163)	Steffi: female Hobbit Magic-User, moves (0) West.

What orders would you give? Next time, we'll tell you what we did.

DragonSmoke* and *DragonFun

DragonSmoke is our monthly newsletter about new ways to learn, including computers, role playing games, play-by-mail games, COPY ME stuff, public domain instructional materials, software for beginners and our own play-by-mail game, *DragonFun*.

DragonFun is a play-by-mail role playing game for beginners. It is non-violent and features cooperation, exploration, problem-solving and story-telling. How to play is described in the February 1985 issue of *DragonSmoke*. For a free copy, send a self-addressed, stamped envelope to *DragonSmoke*, P.O. Box 7627, Menlo Park, CA 94026.

Flash! We have just learned from Reston Publishing Company that they are taking *Adventurer's Handbook* out of print, so we bought all remaining copies. We will make these available at a big discount through *DragonSmoke*.

ROLE PLAYING GAMES

Millions of people play role playing games. A role playing game is a game in which one or more players create and play characters (adventurers) who live their imaginary lives in a specially made game world. The game world is created, managed and operated by a GameMaster (GM), referee, or dungeon master (DM).

Most people who play role playing games use a formal rule system. Some of the best known are shown below.

***Bushido.** Fantasy Games Unlimited, P.O. Box 182, Roslyn, NY 11576.*
***Champions.** Hero Games, 92A 21st Avenue, San Mateo, CA 94402.*
***Dungeons & Dragons (D&D).** TSR, P.O. Box 756, Lake Geneva, WI 53147.*
***RuneQuest (RQ).** Avalon Hill, 4517 Harford Road, Baltimore, MD 24214.*
***Star Trek.** FASA, P.O. Box 6930, Chicago, IL 60680.*
***Tunnels & Trolls (T&T).** Blade, P.O. Box 1467, Scottsdale, AZ 85252.*

Beginners beware! The rule books are formidable. If you are a beginner, we suggest you start with one of the following books, both from Reston Publishing Company, 1480 Sunset Hills Road, Reston, VA 22090.

***Adventurer's Handbook: A Guide to Role Playing Games** by Bob Albrecht and Greg Stafford.*

*You will also need **Adventurer's Handbook** if you play our play-by-mail beginner's game. We call it DragonFun.*

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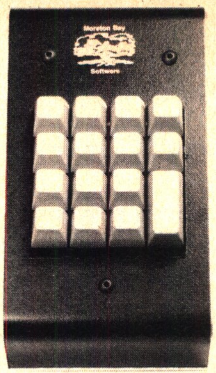

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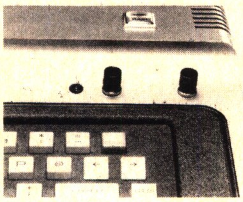

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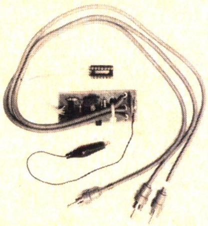

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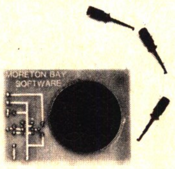

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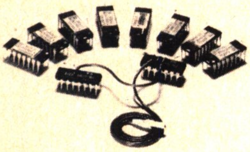

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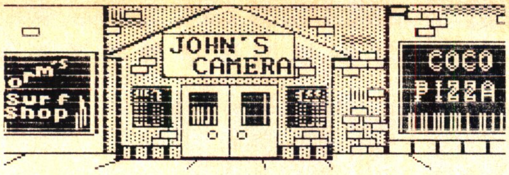
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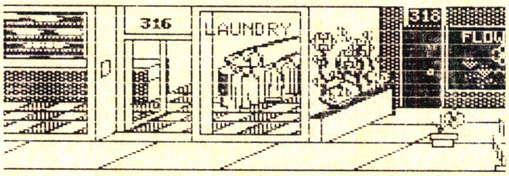
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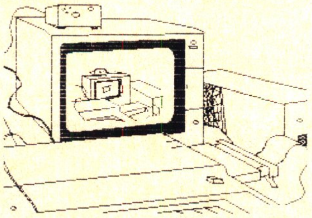

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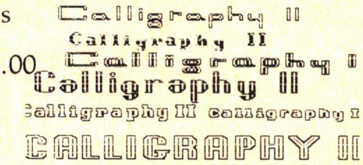
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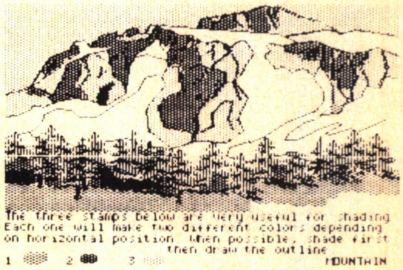
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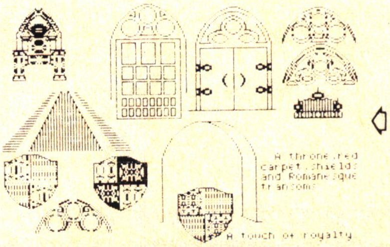
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144,350	Theodore Latham Jr., Rich Square, NC
98,450	Kent Jakway, Garrett, IN
77,300	David Barnekow, Elkhorn, WI

MONSTER MAZE *(Radio Shack)*

205,180	★Richard Fiore, Clemson, SC
200,020	Terry Steele, Summerfield, NC
200,000	Jason Pelfrey, Germantown, TN
115,130	Theodore Latham Jr., Rich Square, NC
32,470	Brett Ankrom, Atlanta, KS

MR. DIG *(Computerware)*

3,259,750	★Ellen Ballinger, Uxbridge, Ontario
3,100,650	Biagio Di Lorenzo, Montreal, Quebec
3,001,100	Ross & Daniel Mehlman, Todd Boehm, Nashville, TN
2,875,870	Ann-Marie MacKay, Port Hardy, British Columbia
2,520,650	Thomas Henry, Boca Raton, FL

MUDPIES *(MichTron)*

285,600	★Stephen Zamonski, Ewing, NJ
249,800	Brian Wolfgram, Freeland, MI

SCOREBOARD

OFFENDER *(American Business Computers)*

289,300	★Christine Leonard, Minona, NY
127,500	B.J. McDonald, Mint Hill, NC

PENGUIN (THE RAINBOW)

11,660	★David Bartmess, Fayetteville, PA
10,660	Mike Brattain, Ft. Wayne, IN
6,800	Sean Conner, Summit, NJ
6,160	Jon Hobson, Plainfield, WI
5,200	Diego Gallina, Summit, NJ

PIPELINE (THE RAINBOW)

1,332	★Kent Prehn, Carol Stream, IL
1,162	Mike Garozzo, Morrisville, PA
925	Andy Green, Whitehall, PA
483	Susan Ballinger, Uxbridge, Ontario
405	Joe Bironas, Crestwood, KY

PLANET INVASION *(Spectral Associates)*

59,600	★Terry Steele, Summerfield, NC
32,350	Susan Ballinger, Uxbridge, Ontario
10,750	Saul Kirsch, Ra'anana, Israel
8,950	Michael Derman, Tel-Aviv, Israel

POLARIS *(Radio Shack)*

171,862	★Thomas Levasseur, Rockland, ME
133,726	Ed Meyer, Vancouver, British Columbia
112,535	Brett Ankrom, Atlanta, KS
87,910	Ron Sujkowski, Bay City, MI
62,586	Bart Ankrom, Atlanta, KS

POOYAN *(Datasoft)*

1,546,000	★Jeff Connell, Winona, MN
900,250	Daniel Belisle, Montreal, Quebec
194,800	Helene Gilbert, Rouyn-Noranda, Quebec
106,100	Tom Neal, Wabash, IN
105,800	Kevin McGiverin, Howard City, MI
50,450	Ken Dewitt, Blue Island, IL
46,500	Mariano Frausto, Blue Island, IL

POPCORN *(Radio Shack)*

28,810	★Steven Roth, Fannystelle, Manitoba
28,520	Teri Block, Sewell, NJ
26,140	Wes Thompson, Olney, IL
24,130	Phyllis O'Grady, Port Charlotte, FL

PROJECT NEBULA *(Radio Shack)*

2,010	★Dan Heater, Cortland, OH
1,705	Ken Krejca, Chicago, IL
1,540	Tim Rueb, Atlanta, GA
485	Jeff Kilsdonk, Milwaukee, WI
220	Jason Pelfrey, Germantown, TN

Q-NERD (THE RAINBOW)

1,958,950	★Bruce Baltzer, Hanover, Ontario
61,290	Sean Conner, Summit, NJ

QUEST *(Aardvark)*

5,720,875	★Mike Cook, Phoenix, AZ

QUIX *(Tom Mix)*

907,320	★Andrew Norrie, Mississauga, Ontario
323,373	Jean-Francois Lauzier, Asbestos, Quebec
187,553	Stephane Asselin, Baie-Comeau, Quebec

RAAKA-TU *(Radio Shack)*

50	★Ellen Ballinger, Uxbridge, Ontario
50	★Faith Barnett, Syracuse, NY
50	★Scott Bellman, Davenport, IA
50	★Jeff Brock, Ft. Lauderdale, FL
50	★Mike Bubb, Grafton, OH
50	★Mike Camden, Follansbee, WV
50	★Brett Casteel, Russell, PA
50	★Chris Cope, Central, SC
50	★Aaron Flaugher, Hamilton, OH
50	★Richard Gain, Tyler, TX
50	★Jerome Galba, Rochester, MI
50	★John Kidd, Clarksboro, NJ
50	★Barney Laverty, Gauley Bridge, WV
50	★Jason Morrison, Spruce Grove, Alberta
50	★David Oelhaupl, Calgary, Alberta
50	★Michael Thomas, Flint, MI
40	Bart Ankrom, Atlanta, KS
40	David Bryan, Kentwood, LA
40	Jeff Dempsey, Eatonville, WA
30	Bryan Canterbury, N. Ridgeville, OH
25	Ryan Devlin, Louisville, KY
25	Joel Flaugher, Hamilton, OH
25	Patric Flaugher, Hamilton, OH
20	Russ Auld, St. Petersburg, FL

RACER (THE RAINBOW)

90.2	★Chris Neal, Wabash, IN

RADIO BALL *(Radio Shack)*

3,708,810	★Stephen Zamonski, Ewing, NJ
1,738,150	Mickey Emberton, Indianapolis, IN
1,511,640	Kelly Dion, Cap-de-la-Madeleine, Quebec
1,465,000	Les Dorn, Eau Claire, WI
1,230,300	Melvin Sharp, Baltimore, MD
1,175,100	Derek Kennedy, Kamloops, British Columbia

RETURN OF THE JET-I *(ThunderVision)*

538,432	★Matt Griffiths, Stilwell, KS
429,160	Jean-Francois Bruneau, St-Hubert Quebec

ROAD RACE (THE RAINBOW)

91.7	★Bill Martin, Myrtle Beach, SC
576.6	Eric Clarkson, Missouri City, TX
706.1	Michael Hebb, Victoria, Australia
1212.4	Michael Martens, Wausau, WI
2158.5	Steven Roth, Fannystelle, Manitoba
2170.1	Michael Box, Peace River, Alberta
2701.9	Jon Hobson, Plainfield, WI

ROBOTTACK *(Intracolor)*

7,528,100	★Mike Scharf, Fremont, OH
3,364,100	Wade & Troy Woods, Paul MacLennen, Tiverton, Ontario
3,242,812	Edwin Prather & Cory Soper, Oxnard, CA
2,516,050	Horace Hamilton, Calgary, Alberta
2,216,950	Randy Hankins, Tabor, IA
457,000	Matt Anderton & Kirk Miller, East Lansing, MI
405,000	Mariano Frausto, Blue Island, IL

SAILOR MAN *(Tom Mix)*

535,900	★Scott Sherman, Woodstown, NJ
418,000	Sally Naumann, Hailey, ID
399,300	Jeff Picketts, Brantford, Ontario
383,200	Justin Hein, Union Lake, MI
365,500	Stephane Asselin, Baie-Comeau, Quebec
362,900	Fred Naumann, Hailey, ID
270,000	Terry Steele, Summerfield, NC
160,594	Mark Picketts, Brantford, Ontario
141,200	Chris Gehrke, Nassau, NY

SANDS OF EGYPT *(Radio Shack)*

80	★John Allocca, Yonkers, NY
82	Jeff McKay, Travis AFB, CA
98	Aaron Durkee, Lansing, MI

SCARFMAN *(Cornsoft)*

260,200	★Amy Prehn, Carol Stream, IL

SEA DRAGON *(Adventure International)*

89,900	★Ken Dewitt, Blue Island, IL
4,770	Denis Dion Jr., Thetford Mines, Quebec
4,760	Simon Clavet, Thetford Mines, Quebec
4,040	Jeff Kilsdonk, Milwaukee, WI

SEA SEARCH *(Mark Data)*

140	★John Allocca, Yonkers, NY

SHOOTING GALLERY *(Radio Shack)*

399,400	★Adam Petersen, Portland, OR
46,960	Patrick Scott, Whitehall, NY

SKIING *(Radio Shack)*

01.10	★Mike Scharf, Fremont, OH
01:12	Sean Conner, Summit, NJ
05.85	John Hokpins, Greenville, SC
09.37	Tony Hall, North Bay, Ontario
11.83	Chris Zepka, North Adams, MA
13.15	Ian Frink, Rock Island, IL

SLAY THE NEREIS *(Radio Shack)*

52,581	★Wilfred Thibodeau Jr., Georgetown, ME
24,681	Bobby Cha, Fullerton, CA

SNAKER (THE RAINBOW)

1:24	★Luanne Ashby, Phoenix, AZ
1:26	Dan Sobczak, Mesa, AZ
1:37	Susan Ballinger, Uxbridge, Ontario
1:50	Andy Green, Whitehall, PA
1:59	Baiju Shah, Deep River, Ontario

SPEED RACER *(MichTron)*

111,200	★Mike Rebbecchi, Somerdale, NJ
109,440	Dan Bouges, Niantic, CT
99,550	Scott Cunningham, East Lyme, CT
92,050	Roy Dent, Mission Viejo, CA
84,250	Chris Zepka, North Adams, MA

STAR BLAZE *(Radio Shack)*

7,950	★Matthew Daley, Binghamton, NY
7,950	★Mike Marcol, River Grove, IL
4,500	Ted Barkley, Whitehall, NY

STAR TALK *(Speech Systems)*

130,400	★Michael Scott, Johnstown, NY

STELLAR LIFE-LINE *(Radio Shack)*

62,390	★Andrew Lawrence, Cambridge, Ontario
39,210	Alfred Silva, Cranston, RI
35,550	James Fox, Midlothian, VA
33,250	Jeff Lawrence, Cambridge, Ontario
26,770	David Barnekow, Elkhorn, WI

STORM ARROWS *(Spectral Associates)*

320,100	★Thomas Tiggelbeck, Essen, West Germany
231,100	Uwe Steingens, Essen, West Germany
221,300	Arnold Snitser, Los Angeles, CA
203,050	Rob Leyden, Rochester, NY
164,150	Jon Keeling

TEMPLE OF ROM *(Radio Shack)*

332,400	★Glenn Alfrey, Olympia, WA
237,300	Rhea Jarrard, Olympia, WA
235,660	Jim Issel, Cotati, CA
137,400	David Oelhaupl, Calgary, Alberta
134,900	Matt Griffiths, Stilwell, KS
108,100	Les Dorn, Eau Claire, WI

TRAILIN' TAIL (THE RAINBOW)

119,705	★Diego Gallina, Summit, NJ
105,300	Jerry Dill, Frankfort, MI
102,930	Philip Parent, Smiths Falls, Ontario
94,810	Jean-Marc Parent, Smiths Falls, Ontario
76,275	Michael Rosenberg, Prestonsburg, KY
57,100	Dean McWhorter, Argyle, NY

TUT'S TOMB *(Mark Data)*

184,380	★Biagio Di Lorenzo, Montreal, Quebec
163,060	Michael McCafferty, Oceanside, CA
158,000	Chris Russo, Miami, FL
146,300	Mike Rebbecchi, Somerdale, NJ
134,580	Judy Smith, Gresham, OR

WHIRLEYBIRD RUN *(Spectral Associates)*

30,100	★Dan Durga, Flint, MI
16,900	Stephane Asselin, Baie-Comeau, Quebec

WILLY'S WAREHOUSE *(Intracolor)*

183,500	★Alan Morris, Chicopee, MA
93,700	Craig Kluger, Miami, FL
29,300	Stephane Asselin, Baie-Comeau, Quebec

ZAKSUND *(Elite)*

480,200	★Angel Zuniga, Miami, FL

ZAXXON *(Datasoft)*

2,057,800	★Chris Oberholtzer, Lexington, MA
1,700,000	Biagio Di Lorenzo, Montreal, Quebec
1,510,000	James Quadrella, Brooklyn, NY
666,000	Andy Green, Whitehall, PA
535,400	Chris McKernan, Chateauguay, Quebec
148,500	Diego Gallina, Summit, NJ
145,400	Bob Dewitt, Blue Island, IL
91,000	Michael Santos, Seaford, DE
67,900	Jeff Kilsdonk, Milwaukee, WI
35,000	George Frausto, Blue Island, IL

— Debbie Hartley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

Scoreboard:

For all you people out there who love Adventure games but are having trouble with them, maybe I can help. I have solved *Raaka-Tu* and *Bedlam*. Also, I have solved *Pyramid* in just 113 moves; that is right, 113 moves. I would be more than pleased to help anyone who is having trouble with these programs, and if you are ready to give up and would like the solution, then I will send it to you. All I ask is that you send $1 to cover the cost of postage and material, to 2432 Capitol Hill Crescent, Canada T2M 4C2.

I have noticed in the past few months there are a few people complaining about scores in the "Scoreboard." A person should be honest about his or her score. In a lot of cases the scores could be right, so before you complain about someone's score, make 100 percent sure that it cannot be achieved before you start making a fool out of yourself. After all, in an Adventure game the object is to gather all items in as few moves as possible and that is what can be done in the case of *Pyramid*. Scores can be achieved if you try.

Keep up the great work, RAINBOW.

David R. Oelhaupl
Calgary, Alberta

CALLING MR. AND MRS. SMALL

Scoreboard:

Because of my careless error, I lost your address. I need it in order to send you the directions to *Calixto Island*. Please write back to me so I can get your address and send the help you need. Send it to me at 96 Lions Dr., 19067.

Michael J. Garozzo
Morrisville, PA

A WARM THANKS

Scoreboard:

A couple of months ago I wrote to the "Scoreboard" for help on getting out of the pool in the Adventure game *Sands of Egypt*. With the help of concerned CoCo friends all over the country, I found out it was just a simple command of `CLIMB STEPS`. Since then, I took a more logical approach to the game. I got a couple of friends together and sat down at the computer and brainstormed. In about four hours we finally solved it. I'd like to thank all of the warm people that showed their concern. If there is anyone I can help or would like the solution, you can contact me at 51-2 Maine St., 94535. Please include a SASE.

Jeff McKay
Travis AFB, CA

HOW TO GETAWAY?

Scoreboard:

Here are some hints for *Sands of Egypt*. You can make a rope from the fronds in the big tree, but first you need the axe, which you can get by climbing the pyramid. To drain the pool you need the scepter. To get the scepter you need the snake oil. The scepter is located in a carving at the pyramid.

To get to the pyramid, you feed the camel the dates, then simply ride him three times and dismount. When you are in the pool, you must drain it. To do this, you type `HOOK HOOK` then `TO HANDLE` then `PULL SCEPTER`.

After this, be careful because it's very dark. To place the scepter on the coffin type `PLACE SCEPTER` then `ON MUMMY`. You will then be able to enter the treasure room.

The thing we can't figure out is how to get out with the treasure. Does it have something to do with the mummy, or maybe the ladder?

Pete and Jim
Johnstown, NY

THE TRAP DOOR SOLUTION

Scoreboard:

I have found a way to open the trap door in *Seaquest*. First, you must have the tanks and metal detector. Those are in the grassy meadows. Once you get the detector, go north twice, west twice and north once more. You should now be on the beach. Go east once, push button, dig, get mirror, go west three times, go dock, go boat, north twice, go ocean, down twice and give mirror to mermaid. She gives you the key. You can now open the trap door in the beach house.

For more information write to me at 12506 Wistful, 78729.

HJ Wurzburg
Austin, TX

LIFTING THE LIGHT SABER

Scoreboard:

If anyone is having problems solving the graphics Adventure game *Syzygy*, from Spectral Associates, here are some clues. To kill Darth Vader, you must get the light saber. The light saber is in a room behind the huge, ugly alien. First, go to the room which has the computer and type `PRESS FOUR` to release an alien specimen from its cell. If you press any other key number you will get killed. Now go outside the room and you will see a fuzzy creature. Type `GET FUZZY` to get it, then go back to the dark corridor where the huge, ugly alien is. Now type `THROW FUZZY` and you will kill the ugly alien. Now you can get the light saber.

Another hint — when you battle Darth Vader in the hallway, type `HELP` just a step before you get to him.

Does anyone know how to go through the airless corridor? The spacesuit has holes in it, so you can't use it. If you can help me with this, please write to me at Waterhole Rd., 06415.

Cory Palmer
Colchester, CT

NO LIFE EVERLASTING

Scoreboard:

A little while ago I noticed a list of pokes by Tom Fagan that gives everlasting life, but when I tried it, it didn't work. As soon as I turned on the computer, I keyed in the poke for *Trapfall* and then I loaded the program from disk. However, when I played the game, it still gave me the usual three men. I cannot type the poke in at any other time because the game runs automatically.

If Tom or anyone else knows what I am doing wrong, please write to me a Rt. 1, Box 179, 25414. Your help will be greatly appreciated. Also, I have solved *Dungeons of Daggorath* and *Bedlam* and if anyone would like some hints or tips about playing, I would be delighted to help.

Ben Johnson
Charles Town, WV

Scoreboard:

I have a clue for the game *Calixto Island*, a graphics Adventure by Mark Data. In the first three rooms you are in, be sure to take all of the items with you and drop them in the teleporter. You will have to make two or three trips to get everything. Also, be sure to bring your light with you when you enter the pyramid. Once you are in, go west a few times, then south and north and it will bring you to the snake who is guarding the paddles.

I have solved and completed *Calixto Island*, *Bedlam*, *Downland*, *Dungeons of Daggorath* and *Pyramid*. If anyone needs tips and/or full solutions, s/he can write to me at 69-10 Yellowstone Blvd., 11375. Please include a SASE.

Laurence Zafran
New York, NY

Scoreboard:

I have a hint for all of you who have Radio Shack's *Canyon Climber*. When beyond the first canyon and in the crevasse, go to the top, wait until both goats pass, set one charge, go down the ladder to the next level and climb up the far ladder. When the goats pass, set the other charge. Go down the ladder and then go back to the first ladder next to the plunger. If you have all charges set, wait until the goats pass. Blow the bridges or else set all of the charges, and then blow the bridges. This method eliminates the need to face two goats at once. I hope this helps.

Also, if anybody could send me help for *Madness and the Minotaur* it would be appreciated. Please send all information to 816 Belleville St. Good luck on *Canyon Climber*!

Charles Farris
Lebanon, IL

CHANGE OF ADDRESSES

Scoreboard:

Users of the current *Keys of the Wizard* will have problems saving the cassette version to disk, because the addresses in the manual are wrong. The correct `SAVE` command is:

```
SAVEM "DWIZARD",
&HF00,$H6000,&H202C
```

Now, if I can only find the Sanctuary!

Kevin W. Davidson
Easley, SC

Scoreboard:

In answer to a letter in a recent RAINBOW, to patch the game *Frogger*, do the following:

```
LOADM"FROGGER"
POKE 7175, &HCB
SAVEM"FROG", &H1C00,&H3F02,$H3EDD
```

Robert Klase
APO, NY

Scoreboard:

In the game *Keys of the Wizard*, I have some helpful news. If you happen to find the mace, then type (for example) `BASH BAT` or `BASH ORC`.

The first creature you should kill is the troll, then the bat and then the orc. I have never gotten past any of the others. I think the next one I should kill is the jester, because he seems to be the second most harmless (the unicorn is the most harmless) of them all.

If you get out of the maze of tunnels by going down, then go south and keep following that trail until you get to a dead end. Then drop everything you are holding and open the crypt, then go down. To get to the room with the box from the cottage, you type `W W W N D D E E E E E S W S E` and go south until you reach the dead end.

Does anyone know how to load the pistol on Level 1? Please write to me at Box 694, Canada V0S 1N0.

Rob Grigor
Sooke, British Columbia

Scoreboard:

Here are a couple of hints for the *Temple of ROM*. The bat appears at fairly regular intervals, so when you know he's coming wait for him in a fairly large room. When he shows up, start shooting the wall nearest to him and the explosions will nail him as soon as he gets there. Also, when you find a crystal ball don't pick it up until the bat spots you. Then, immediately pick up as many treasures as you can before he comes back, getting double points for each. Slip through a transfer portal, if you can, to further confuse the bat.

If anyone would like to help me out on *Madness and the Minotaur*, please write to 7968 Sunflower Dr., 94928. I have endless maps, but have never scored more than 10 points.

Jim K. Issel
Cotati, CA

Scoreboard:

In the game *Bustout*, you can get over 42,000 points if you keep the score under 42,000 until the very last. It then resets to zero. If you need help with *Bustout*, you can contact me at P.O. Box 42, Canada R0G 0P0. Please enclose a SASE. I will respond as quickly as possible.

Steven Roth
Fannystelle, Manitoba

Scoreboard:

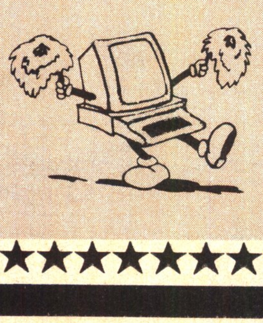
Here are some hints for *Black Sanctum* and *Calixto Island*.

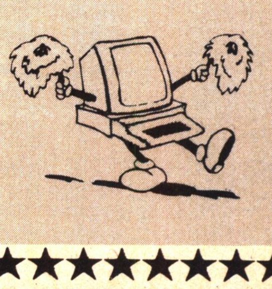
In *Black Sanctum*, the salt is in the secret room. To get to the secret room, play Bach at the organ. The sheet music is in the library.

In *Calixto Island*, be sure to search everything twice. Also, conserve the use of the flashlight.

When playing *Zaxxon*, on every other screen there is a "safe" spot in the lower right-hand corner if you continue to shoot.

Shawn Callahan
Timonium, MD





Introducing The CoCo Gallery

Here's the first installment of THE RAINBOW's new "CoCo Gallery" feature, where we showcase the artistic talents of our readers. To kick it off, we've selected five pictures by three well-known CoCo artists — Linda Nielsen of Moreton Bay Software, Eric White of Whitesmith and Ana Landa Hutchison, whose works have often been seen on the Color SIG on CompuServe (GO PCS-126).

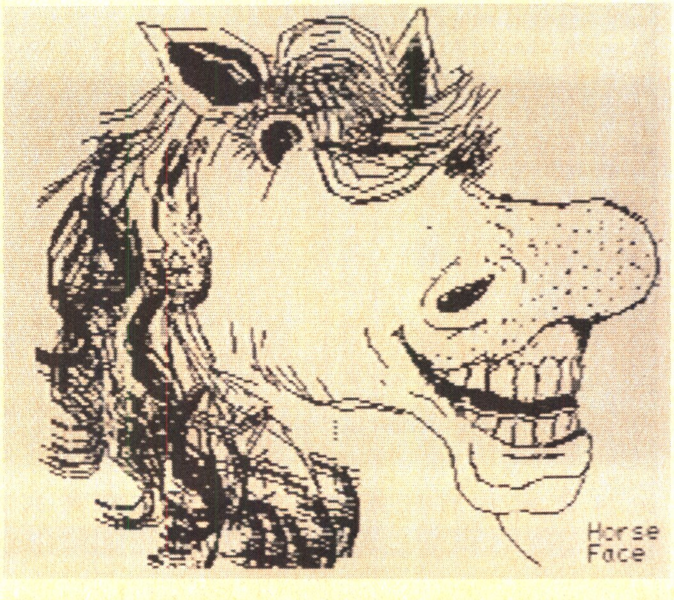
You don't have to be one of the top artists to get your works featured here, though. Just send it, in tape or disk form, to:

CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059

Be sure to include details about how you created your picture (what programs you used, etc.) and how to display it. We'll shoot a photo off the monitor screen here, so there's no need for a screen dump. (By the way, the pictures shown here were taken from a Panasonic CT-1300D color monitor using a Bronica SQ-A "2¼-square" SLR and Ektachrome 400 film. We used a shutter speed of 1/15 sec at f/11.)

We will award a first prize of $25, a second prize of $15 and a third prize of $10 each month. Honorable mentions will also be given.

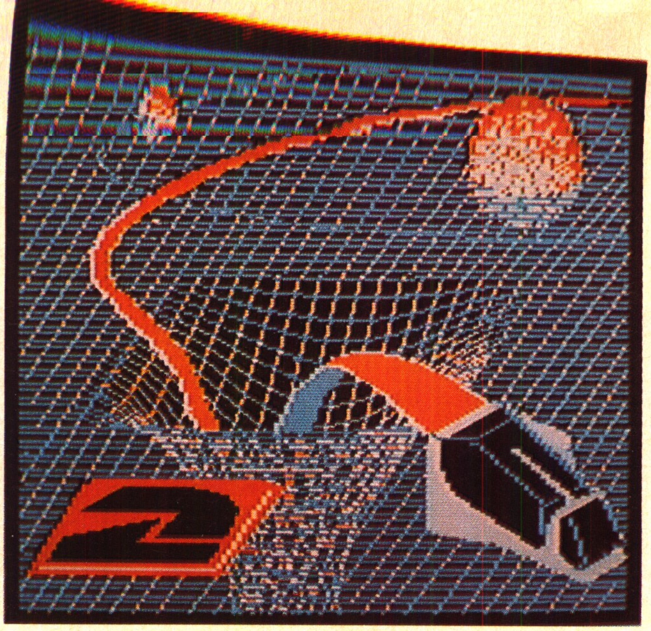
Please don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.



Ana Landa Hutchison

Horse Face

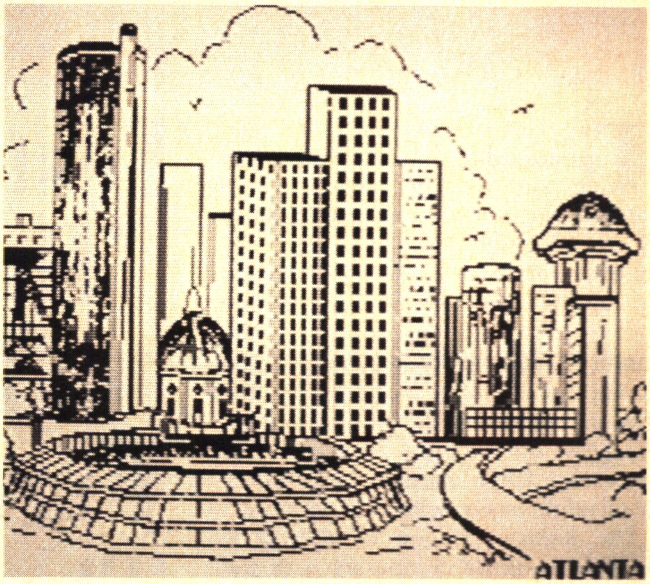
"*ANA*," as the Color SIG members know her, drew this using *Graphicom*.



Eric White

Black Hole

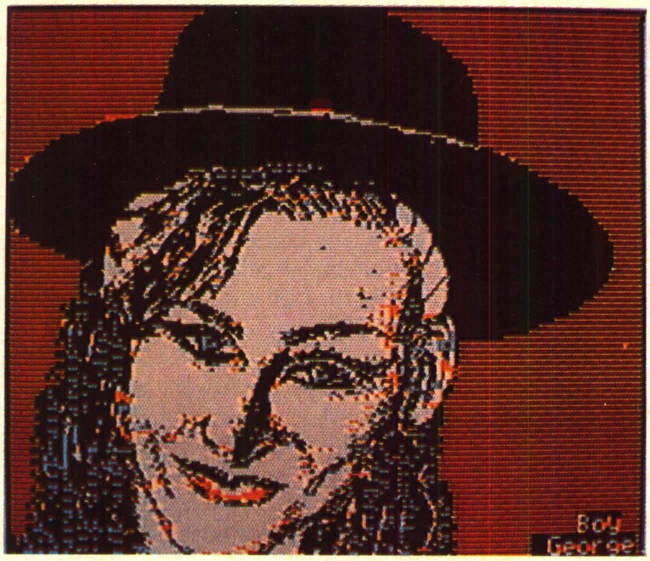
The science fiction addicts among us will love this! Drawn with Whitesmith's own development software.



Ana Landa Hutchison

Atlanta Skyline

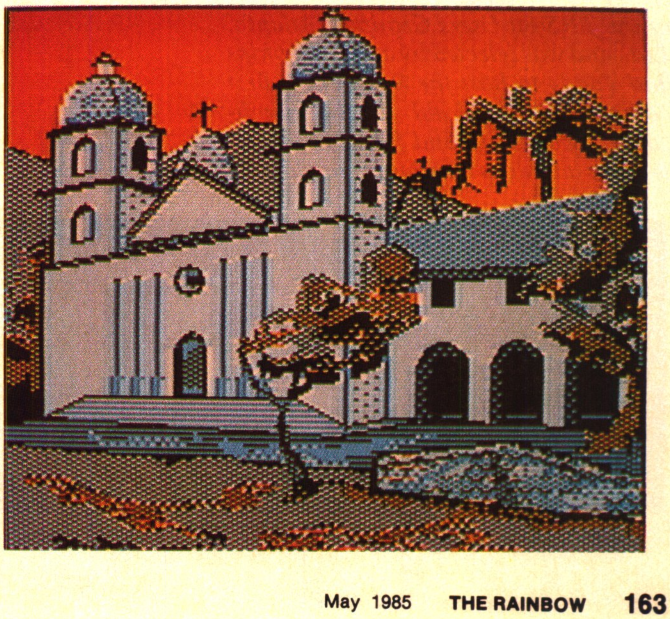
If you've been to Atlanta (or if you watch *The Catlins*), you'll recognize this skyline. Drawn with *Graphicom*.



Ana Landa Hutchison

Boy George

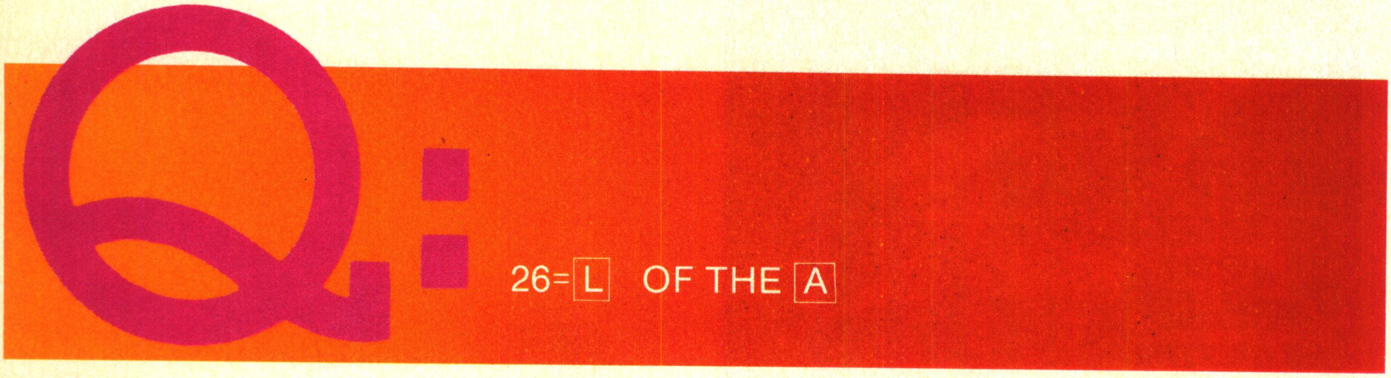
No matter what you think of Boy George, you have to admit that this is a very good likeness. This also was done using *Graphicom*.



Linda Nielsen

Spanish Mission

This shows a very skillful use of `PMODE` 4 color. Drawn with *Graphicom*.



Test Your 'Eye Q' By Figuring The Clue

By Robert L. Green

The CoCo can easily be programmed to simulate games such as the *Eye Q* game. *Eye Q* presents one or more numbers followed by an equal sign which is followed by a phrase with some words only indicated by initials. The test of one's ability comes in giving meaning to the number(s) and thereby providing clue(s) to the words only initialed by the phrase. For example, the first item in *Eye Q* is: 26=L. of the A. Most of us know there are 26 letters of the alphabet, so we might easily solve that equation.

The BASIC program of *Eye Q* is portable to other computers with the exception of the `SOUND` commands.

Line 11 dimensions arrays used for questions and answers as well as a set for erroneous responses and the accompanying questions with their correct answers. "L$" is used for a patterned line display.

Line 18 sets up the menu, which provides options not available on a game of *Eye Q* on paper. I was going to add a printer option, but `LLIST 35-58` easily accomplishes the task. Those `DATA` lines are organized so the first data read is the equation and the second data (following the comma) is the correct response(s). They are not separated for human identification, but the arrangement works well on saving typing, memory and computer use.

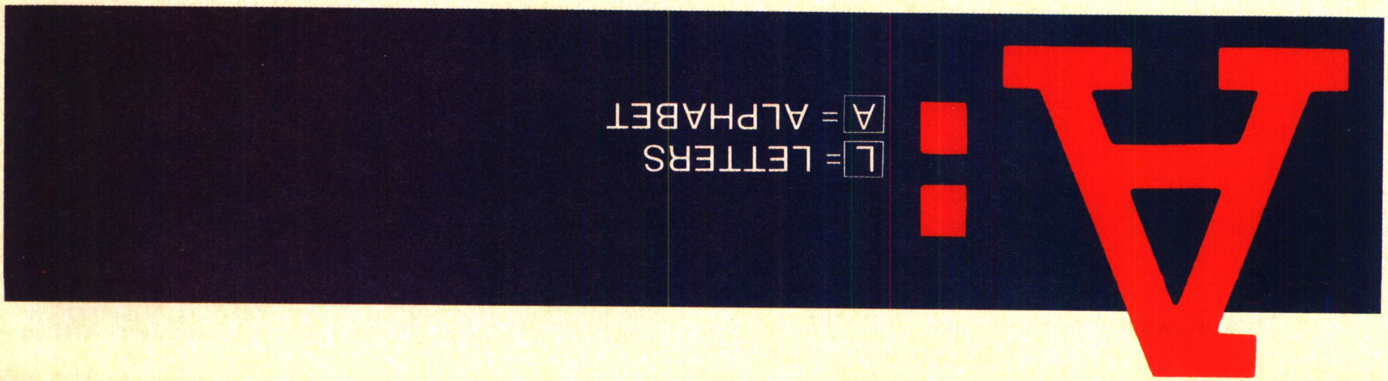
The menu offers options of reviewing the equations, looking at the answers, playing the game and quitting. One may also quit by typing 'Q' as the first answer to an equation question.

Line 81 is the `GOSUB INKEY$` line that `RETURN`s to the various calling lines. This program concatenates or connects the answers to an equation into a long string and compares that to the second data items mentioned above.

Another advantage the computer has over paper is that the answers are held by the program software, thus allowing questions and answers not becoming separated .

Line 62 replies to correct answer(s), while Line 64 replies to the incorrect answer(s). Line 65 sets up the erroneous answer arrays for later reviewing before the proper answers are given (if the player so wishes).

(Robert L. Green is the former president of the TRS-80 Users Group of Atlanta, Ltd., and was selected by Johns Hopkins and Tandy to host the Southeast's first computer-assisted aid to the handicapped workshop and fair. He writes, teaches and does consulting work.)



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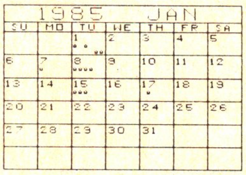
GET YOUR LIFE ORGANIZED

DATE-O-BASE CALENDAR

puts YOU in charge of your schedule!



1985			JAN			
SU	MO	TU	WE	TH	FR	SA
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

- Graphically displays any monthly calendar between 1700 and 2099. You put in up to twelve 28 character memos per day . . . calendar shows where the memos are . . . call up of day shows details.
- Use for appointments or a log of past activity.
- Search capability allows you to list or print all memos between two specified dates or only ones meeting key-word criteria.
- Date computation shows elapsed time between two dates in days, weeks, months and years.
- Printed graphic calendar available with optional Screen Print Program.
- Requires 32K in BASIC

TAPE DATE-O-BASE CALENDAR - $16.95 (max. 400 memos/tape file)

DISK DATE-O-BASE CALENDAR - $19.95 (over 4000 memos/disk . . . max. 300 memos/month)

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

GRAPHIC SCREEN PRINT PROGRAM

Works in all PMODES and lets you shift screen image anywhere on the printed page.

- Relocatable code lets you use all of your 16K or 32K machine.
- Available in Color Basic 1.0 and 1.1/1.2. Use EXEC 41175 to see which you have and SPECIFY WITH ORDER.
- SPECIFY PRINTER TYPE . . . in Machine Language.

$7.95 - TRS-80© LP-VII/VIII & DMP 100/105/200/400/420

$9.95 - Epson GRAFTRAX©, NEC© PC 8023 A-C, IDS 440/445, Paper Tiger© 460/560, Micro Prism© 480, Prism© 80/132 (with dot plotting), TRS-80© DMP-120, DMP-110, TDP-1, PROWRITER© Centronics 739, Microline© 82A/83A (with Okigraph 1) /84/92/93, Star Micronics, Inc. GEMINI 10/10x/15 and Gorilla Banana (Trademarks of Tandy Corp., Epson America, Inc., C-Itoh, NEC America, Okidata Corp., Integral Data Systems, Inc.)

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

1
43
+69
102
1+4+6=11

HELP YOUR CHILDREN HELP THEMSELVES

MATH TUTOR

- 5 Programs in 1 . . . ranges from simple addition through long division with 4 levels of difficulty.
- Requires regrouping to be shown . . . provides for trial quotients in long division.
- Shows how to correct errors . . . step by step approach stresses accuracy.

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★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

SPELLING TEACHER

- Teaches students their own word list . . . tape or disk files hold up to 200 words each.
- Suitable for any level from kindergarten to college.
- Misspelled words are retaught to reinforce correct spelling.
- Words presented in 4 lively formats - study, scrambled word game, trial test, final test.

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PUT YOUR FINANCES IN ORDER

DISK DOUBLE ENTRY

If you have spent hours trying to balance your Debits and Credits, DISK DOUBLE ENTRY is for you!

- Designed for small business, club and personal use.
- Enter transactions in a journal type format. Program will maintain current account balances, produce Trial Balance, Income, and Balance Sheet reports and complete Account Ledgers.
- Will handle up to 300 accounts including report headings and totals.
- Up to 1400 average transactions on a diskette.
- Summary reports and four levels of subtotals available.
- Requires 32K and an understanding of standard double entry accounting concepts.

$44.95 in BASIC with Machine Language subroutines

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

STATEMENT WRITER

For use with (and requires) Disk Double Entry

- Produces statements suitable for billing from your Receivables accounts.
- Provides account summaries and mailing labels to use with your statements.
- Designed and documented to allow you to change formats to accommodate your own special needs.

$34.95 in BASIC

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

That's INTEREST-ing

Let your computer do some REAL computation!

- Helps you solve problems dealing with time, money, and INTEREST!
- AMORTIZATION TABLES any way YOU want them . . . even lets you change any terms mid-schedule!
- Calculate Present Value, Future Value, Capital Recovery for any combination of payments you specify.
- Rate of Return computation predicts how hard your money will be working for you!
- Computes Bond yields . . . current and to redemption.
- All answers available on screen or printer.

$29.95 in BASIC

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

ALPHA-DRAW

Works great with GRAPHIC SCREEN PRINT PROGRAM!

- Subroutine designed to let you add any keyboard character to your graphic displays.
- You define X and Y coordinates and a string variable of one or more characters . . . ALPHA-DRAW does the rest!
- BONUS - includes instructions for a true line-numbered merge of tape files.

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ALL PROGRAMS require Extended Color Basic and are delivered on cassette. All, except Tape Date-O-Base Calendar, are DISK System compatible.

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RAINBOW CERTIFICATION SEAL
ALL LISTED PROGRAMS

VISA MasterCard

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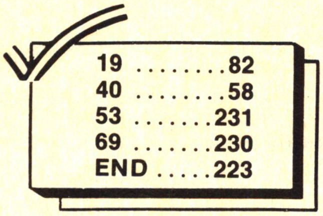
Line 68 lists the equations and corresponding correct answers and Line 72 ends the program.

Line 73 starts the instructions for neophytes and Line 78 permits the reviewing of the equations (without answers) to be covered, then goes back to the menu as do most subroutines.

It is a simple matter to change the data lines 35-58 when these initial equations become well-known, or to make them easier or more difficult, considering the player(s).

Anyone having questions about the program may contact me at P.O. Box 419, Clarkston, GA 30021, phone (404) 451-9813.



19 82
40 58
53 231
69 230
END 223

The listing: *EYE Q*

```
10 'EYEQ COPYRIGHT 3-22-84 BY RO
BERT L. GREEN  P.O.BOX 419, CLAR
KSTON, GA 30021
11 CLEAR1000:DIMQ$(25),CA$(25),S
Q$(25),A$(25),W$(52),WA$(52):CLS
:L$=STRING$(32,"%")
12 PRINT:PRINTL$:PRINT:PRINTTAB(
12)"eyeq":PRINT:PRINT:PRINTL$:FO
RT=210TO250STEP2:SOUNDT,1:NEXT:P
RINT" want instructions (y/n) ?"
13 'GOSUB9999:IFI$="Y"THEN8000
14 TD=24:FORX=1TOTD:READQ$(X),A$
(X):NEXT:RESTORE
15 GOSUB81:IFI$="Y"THEN73ELSE18
16 PRINT:PRINTL$:INPUT"HOW MANY
TO DO (1-24)";TD:IFTD<1ORTD>24TH
EN16
17 GOTO21
18 CLS:PRINT:PRINTTAB(13)"MENU":
PRINTL$;:PRINT" <1>=REVIEW ALL E
QUATIONS":PRINT" <2>=PEEK AT EQU
ATION & ANSWERS":PRINT" <3>=CONT
INUE":PRINT" <4>=QUIT":PRINTL$:P
RINT" PRESS A number
19 GOSUB81:I=VAL(I$):IFI<1ORI>4T
HEN18
20 ON I GOTO78,68,16,72
21 Q$(TD+1)="EOF":A$(TD+1)="EOF"
:FORX=1TOTD+1
22 READQ$(X),A$(X):SOUND 1,5
23 CLS:IFQ$(X)="EOF"THENCH=0:FOR
X=1TOW:Q$(X)=W$(X):A$(X)=WA$(X)
24 L=LEN(Q$(X)):FORP=1TOL:IFMID$
(Q$(X),P,1)="."THENCH=CH+1:SQ$(C
H)=MID$(Q$(X),P-1,1)
25 NEXTP
26 PRINTTAB(14)"#";X:PRINTL$:PRI
NT:PRINTQ$(X):FORT=1TO9:G$(T)=""
:NEXTT:G$="":FORT=1TOCH
27 PRINTL$;:PRINTSQ$(T);"=";:LIN
EINPUTG$(T):G$=G$+G$(T):IFG$(T)=
"Q"THEN72
28 NEXTT
29 FORM=1TO100STEP2:IFMID$(A$(X)
,M,2)="*"THEN30ELSECA$(X)=CA$(X)
+CHR$(VAL(MID$(A$(X),M,2))):NEXT
30 IFG$=CA$(X)THENGOTO61ELSE63
31 IFLEFT$(W$,1)="Y"THENCLS:GOTO
27
32 NEXTX
33 IFQ$(X)="EOF"THEN68
34 ' 1-24 EQUATIONS & ANSWERS
35 DATA26=l. OF THE a.,766984846
98283657680726566698 4*
36 DATA7=w. OF THE w.,8779786869
82838779827668*
37 DATA1001=a. n.,65826566736578
787371728483*
38 DATA12=s. OF THE z.,837371788
3907968736567*
39 DATA54=c.IN A d. (WITH 2 j.),
67658268836869677574797569828 3*
40 DATA9=p. IN THE s. s.,8076657
869848383797665828389838 46977*
41 DATA88=p. k.,8073657879756989
83*
42 DATA13=s. ON THE a. f.,838482
```

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PRINTMASTER

A full featured screen print program that will work with any printer capable of dot addressable graphics is now available for the color computer. This value packed program should be on everyones 'must have' list. Just look at these powerful specifications:-

Automatic PMODE recognition.
Menu driven or called from Basic
Vertical and horizontal stretching (zoom)
Full or partial screen rotation
8 color recognition & separation
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All of the above will work on the full screen or on any portion that you specify.

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ROMMASTER

Rommaster is a circuit board with a rotary switch and sockets for three EPROM's (24 or 28 pin) that can be individually selected. You can now have up to three versions of Basic and three versions of Extended Basic in your Coco at the same time.

If you wish you can burn your own EPROM's and have them available on power up at the flick of a switch. If you develop software for sale it is essential that your programs be tested on all versions and configurations of ROM's before you release them.

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```
73806983657769827367657870766571
*
43 DATA32=d. f. AT WHICH w. f.,6
86971826969837065728269787269738
4876584698270826969906983*
44 DATA18=h. ON A g. c.,72797669
8371797670677985828369*
45 DATA90=d. IN A r. a.,68697182
69698382737172846578717669*
46 DATA200=d. FOR p. g. IN m.,68
79767665828380658383737871717977
79787980797689*
47 DATA8=s. ON A s. s.,837368698
383847980837371 78*
48 DATA3=b. m. (s.h.t.r.!),66767
37868777367698369697279878472698
9828578*
49 DATA4=q. IN A g.,818565828483
716576767978*
50 DATA24=h. IN A d.,72798582836
86589*
51 DATA1=w. ON A u.,877269697683
857873678967 7669*
52 DATA5=d. ON A z. c.,687371738
4839073806779 6869*
53 DATA57=h. v.,7269737890866582
736984736983*
54 DATA11=p. ON A f. t.,80766589
69828370797984666576 7684696577*
55 DATA1000=w. THAT A p. IS w.,8
77982688380736784858269877982847
2*
56 DATA29=d. IN A f. IN A 1. y.,
68658983706966828565828976696580
89696582*
57 DATA64=s. ON A c.,83818565826
983677269677569826679658268*
58 DATA40=d. AND n. OF THE g. f.
,68658983787371728483718269658 47
076797968*
59 DATAEOF,EOF
60 DATAEOF,EOF
61 'RIGHT
62 SOUND190,5:CLS:PRINT:PRINT:PR
INT:PRINTTAB(12)"right":PRINTQ$(
X):FORT=1TOCH:PRINTG$(T):NEXT:FO
RS=1TO50:NEXTS:PRINTA$:FORS=1TO5
00:NEXTS:CH=0:GOTO32
63 'WRONG
64 SOUND2,4:CLS:PRINT:PRINT:PRIN
T:PRINTTAB(12)"wrong":FORS=1TO50
0:NEXT:PRINT:PRINT:PRINT" want a
nother try at number ";X
65 PRINT:PRINTTAB(11)"yes or no
";:GOSUB81:IFI$="Y"THEN26ELSEW=W
+1:W$(W)=Q$(X):WA$(W)=A$(X):CH=0
:GOTO32
66 'WRONG ARRAYS
67 GOTO23
68 CLS:PRINT:PRINT:PRINT"want to
 see some answers ?
69 GOSUB81:IFI$<>"Y"THEN72
70 FORX=1TOTD:PRINT:PRINTQ$(X):P
RINT"answers ";A$(X):PRINT:PRINT
"HIT c TO cONTINUE"
71 GOSUB81:I$=INKEY$:NEXT:GOTO18
72 CLS:FORX=1TO16:PRINTTAB(11)"B
YE-BYE":FORH=1TO50:NEXT:SOUND2,1
:NEXT:CLS:END
73 'INSTRUCTIONS
74 CLS:PRINTL$:PRINTTAB(10)"inst
ructions":PRINT:PRINT" YOU WILL
BE SHOWN AN EQUATION.":PRINT"FRO
M THE NUMBER CLUE, MATCH THE COR
RECT WORDS TO THE darkened   INI
TIALS.":PRINT:PRINT"ENTER Q FOR
THE FIRST INITIAL TOQUIT eyeq ."
:PRINTL$:PRINT" PRESS p"
75 GOSUB81
76 CLS:PRINT:PRINTL$:PRINT" YOU
WILL NEXT HAVE A CHANCE TO  GUES
S THOSE YOU MISSED  BEFORE  THE
ANSWERS ARE PROVIDED YOU.":PRINT
:PRINTL$:PRINT"  HIT c TO cONTIN
UE"
77 GOSUB81:GOTO18
78 'REVIEW EQUATIONS
79 CLS:PRINTL$:FORX=1TO24:PRINT"
    EQUATION #";X:PRINTQ$(X):PRI
NTL$:PRINT" PRESS c TO cONTINUE"
80 I$=INKEY$:IFI$=""THEN80ELSECL
S:NEXT:GOTO18
81 I$=INKEY$:IFI$=""THEN81ELSERE
TURN
```

LET US ENTERTAIN YOU!

A) FRANCHISE by Steve Hartford Have you watched chain stores pop up all around & wondered what it would be like to own, operate, and expand your own franchise? This is your chance to test your business savvy!

You begin with just one "Frank's" fast food restaurant but plan to expand rapidly! In the beautiful graphics of your office, you review last week's financial statements. Study your total gross sales from all stores, your expenses (advertising, food, labor, equipment, etc.), net income, & bank balance. Now make your management decisions that will affect (positively or negatively) next week's financial statement!

If the market is right, you may sell another franchise which will increase income. You'll also scope out the competition. McBurger and Taco Plus will surely try to squeeze you out!

But business isn't that easy! There are lots of little complications – like health department inspections that can close a restaurant if the food quality drops too low! And from time to time, you will have to help out at a restaurant. In arcade style action, you serve customer orders & how well you do affects customer satisfaction!

Franchise challenges the mind, pleases the eye with beautiful graphics, & tests the coordination with extra arcade interludes. Because this is a simulation of business & you make the decisions, it is different every time you play!

Requires 64K & joystick **Cass $24.95 Disk $27.95**

B) VOX CHESS by David Crandall Vox Chess is always an eager opponent to test your chess skills against. You'll enjoy the superb graphics and, if you have any of the voice paks that use the SC01 chip (Spectrum Projects, Speech Systems, Real Talker), Vox Chess will talk to you! You'll also appreciate the extra features like self-play, save & load previous games, set up a board layout, & exchange sides. Vox Chess is not the best player, so if you're already an expert, you may be able to beat him. For the beginner or even intermediate chess player, he'll give you a good contest. And for everyone, the graphics & speech are great fun!

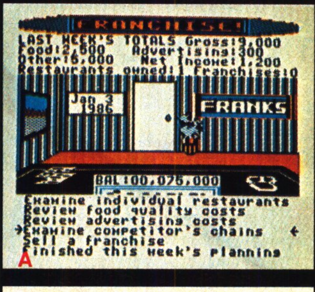
Requires 32K **Cass $21.95 Disk $24.95**

C) STAR TRADER by Steve Hartford Step into the business world of the future and become captain of a merchant starship. From the safety of your Color Computer, you control your ship with joystick (or mouse) in hand. Your graphic cockpit shows read-outs of your location, current damage status, credit balance, cargo destination and due date, the location of any nearby starships, fuel and laser power levels, and the current date. Traveling between distant solar systems, you pick up cargo, deliver cargo, (maybe steal cargo or sell it on the black market), battle pirate ships, and best of all, make money! As you battle and travel, you develop a reputation that will affect your future business and rewards.

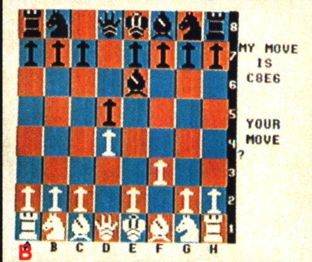
With different skill levels and many variable factors, this graphic simulation offers the excitement and challenge of a new game every time you play.

Requires joystick or mouse and 32K for cassette or 64K for disk.
Cass $24.95 Disk $27.95

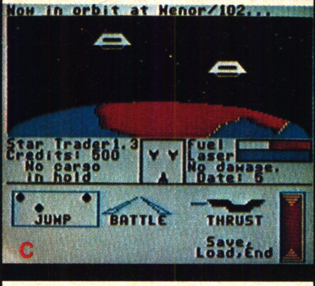
To order: Add $2 for shipping surface. Add $5 for air/Canada.



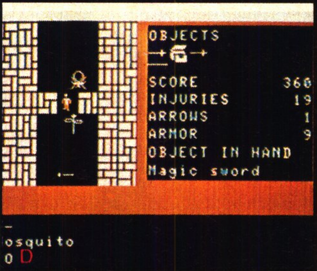
```
LAST WEEK'S TOTALS Gross:9,000
Food:2,600   Advertising:300
Other:6,000   Net Income:1,200
Restaurants owned:1 Franchises:0
BAL:100,075,000
 Examine individual restaurants
 Review food quality costs
 Review advertising costs
→Examine competitor's chains   ←
 Sell a franchise
 Finished this week's planning
```



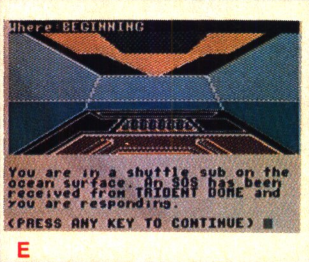
```
MY MOVE
  IS
 C8E6

 YOUR
 MOVE
  ?
```



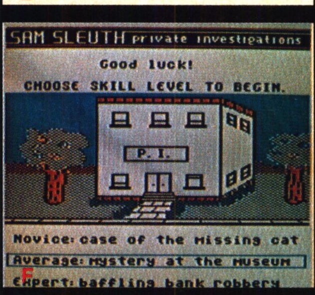
```
Now in orbit at Menor/102...
Star Trader1.3    Fuel
Credits: 500      Laser
  No cargo        No damage.
  in hold          Date: 5
```



```
OBJECTS
SCORE            360
INJURIES          19
ARROWS             1
ARMOR              9
OBJECT IN HAND
Magic sword
osquito
0
```



```
Where:BEGINNING
You are in a shuttle sub on the
ocean surface. An SOS has been
received from TRIDENT DOME and
you are responding.
(PRESS ANY KEY TO CONTINUE) ■
```



```
Good luck!
CHOOSE SKILL LEVEL TO BEGIN.
Novice:case of the missing cat
Average:mystery at the museum
Expert:baffling bank robbery
```

D) DUNGEON QUEST by Steve Seiden Long ago, in a magic age, there lived a brave young lad named Brodric. When he came of age, his father gave him his share of the inheritance, an old rusty sword, & Brodric set out into the world. He heard a legend of an emperor of old, Darius, who had built a subterranean fortress as his home. Darius' empire, however, was short-lived as he died of plague only a few short years after his coronation. On his deathbed, Darius decreed that since he had no heir, whoever would possess the crown would rule the empire.

Brodric decided to go on a quest for the crown. A fortnight or more later, Brodric reached the entrance to the fortress dungeon. He unsheathed his sword & stepped inside. Not five steps later, the floor gave way & sent him tumbling downward . . . Brodric awoke, picked up his sword, & set out to find the crown!

You see Brodric on your screen searching the passageways for the crown. As you guide him with your joystick, you earn points by gathering valuable objects like jewels & chalices, & battle the many monsters that inhabit the dungeon. Can you bring Brodric safely to the crown & earn the rank of Emperor for yourself?

Requires 32K & joystick **Cass $24.95 Disk $27.95**

E) MAJOR ISTAR (Under the Doomed Sea) by BJ Chambless **SCENARIO:** You travel to Trident Research Dome because an urgent call for help is received from one of the service droids stationed there. He said help was urgently needed, but before he could say why, his transmission was cut off!

OBJECT: Solve the mystery at Trident in as few moves as possible.

SETTING: In the beginning of the 21st century undersea cities, interstellar spaceships, colonies in other planets and solar systems, worker droids, super computers, are all realities. One hero of the time is Major Istar. In the late 1990's, when space exploration and colonies began, it was necessary to form a task force to offer help to all that needed it in these hostile environments. You, Cameron J. Istar, are a highly rated member of that team and you have never failed to solve a mystery!

This is a graphics adventure like no other. There are 101 rooms, 33 objects, and 3 arcade sequences! It requires imagination, hand-eye coordination, logic, a sense of humor, and the willingness to take on a challenge!

Requires 64K & joystick **Cass $24.95 Disk $27.95**

F) SAM SLEUTH by Steve Hartford It was my first case & I was a little disappointed. I didn't become a private eye to find lost cats. But the lady was right when she said "you don't look overworked." Shirley said that her friends had gone on vacation & left her to care for their cat. All was fine until this morning when she found the porch door open & the cat gone. Her friends were due back today!

I quickly learned the rules around this town of Elmsville. Reputation really played a part here. And not everyone exactly told the truth or were what I'd call cooperative. Judgement had to be my guide . . .

The next cases came quicker but were much harder to solve. Mr. Atherns was really upset when that ancient Mayan statue was stolen from his museum. I think the lapse of his insurance really put the heat on. And then I worked with good ole Sheriff Walker on the town bank robbery.

Sam Sleuth is a graphic simulation that will intrigue all. You'll enjoy the beautiful graphics as you guide Sam around town with the mouse or joystick. The three mysteries get progressively harder & each will change every time you play, giving endless challenge and fun.

Requires 64K & joystick or mouse **Cass $24.95 Disk $27.95**

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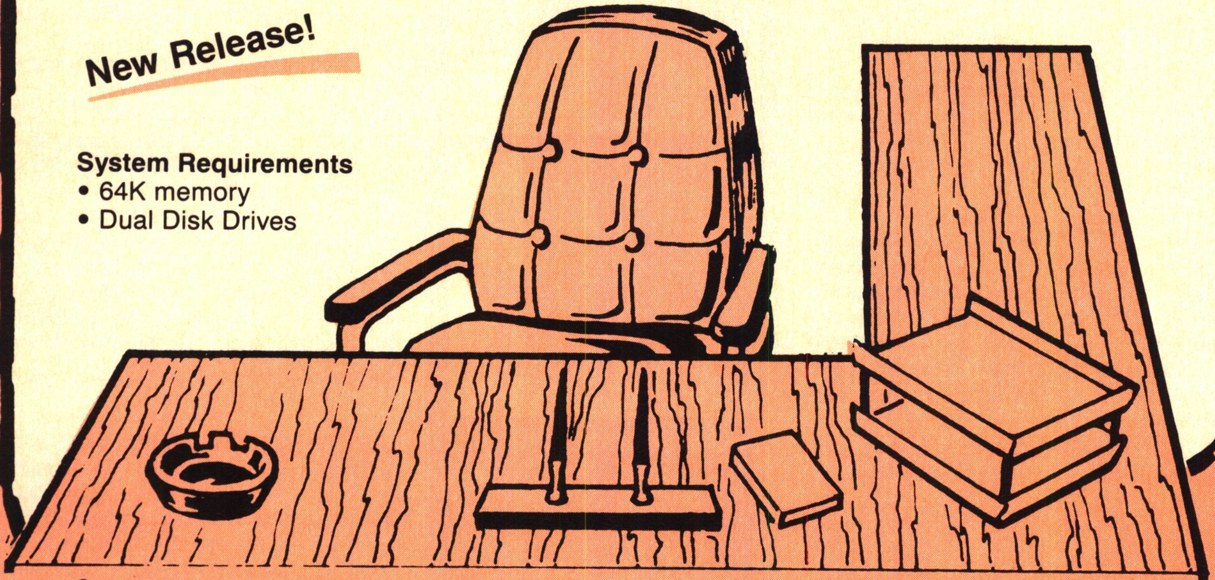
System Requirements
- 64K memory
- Dual Disk Drives



Computerware is proud to present affordable business applications that are easy to use for your CoCo! We are able to offer our powerful business software without requiring any additional software. **All you need is 64K and two disk drives!**

Computerware's business applications have been in use for over 5 years, so you know they are **proven and well-tested.** They are not tutorials, though, and do assume you know and use sound accounting principals. However, these menu-driven systems are truly user-friendly and are accompanied by comprehensive manuals.

GENERAL LEDGER $125

This is a comprehensive double-entry accounting system with complete audit trails, closing procedures, and full reporting. The chart of accounts is flexible and the system easy to use. Reports include the General Ledger, Trial Balance, Balance Sheet, Income Statement, and Transaction Register. Your financial information is at your fingertips!

CHECK LEDGER $125

This is a single-entry bookkeeping system which allows the users to define a chart of income and expense accounts. Year-to-date totals are maintained for each account as well as complete checking account history. By just entering your checking account information, you can have always-current visibility over your income and expense ledgers. Financial statements and taxes are a snap!

PAYROLL $175

This is the most comprehensive payroll you'll find on a micro-computer. Besides collecting key employee information, it allows entry of pay rates for standard hours, overtime, and salary. Hourly, salary, and commissioned employees may be paid weekly, bi-weekly, semi-monthly, and monthly. Two types of special monthly deductions are also accommodated. Year-to-date, quarterly, monthly and current totals are maintained. All federal reporting is done automatically and your state computations are also included.

INVENTORY CONTROL $125

This system is designed to help the retailer, distributor, or businessman to keep control of this important factor. It stores your cost and quantity information, updates it immediately, and offers you key management reports with useful summaries at any time. With four costs, four locations, selling history, and vendor information for each item, you will always have the facts!

ACCOUNTS PAYABLE $125

This system can give you the tools to plan your business' growth by controlling expenditures and forecasting cash requirements. It helps a small business manage and track its cash liabilities by collecting vendor invoice information and reporting the business' cash commitments and payment history. Along with standard payables reports, it also includes a check writer and payment forecast reports.

ACCOUNTS RECEIVABLE $125

All businesses need to know who owes them money! This system provides reliable and timely information regarding the status of all customer accounts. You can know instantly which accounts are past due, forecast how much money to expect to receive for cash flow planning, and keep on top of your customers' credit positions. Customer name, address, credit limit, invoice, and payment information is recorded and reports of all information including customer statements are available upon your request.

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FOR SERIOUS USERS...

COLOR BASIC COMPILER

by Warren Ulrich III

NEW FEATURES

If you like programming in BASIC but want the benefits of machine language, the Color Basic Compiler is for you! It lets you write in the familiar Extended Basic and then converts it to machine language for you. Your compiled programs will run an average of **40 times faster!**

Unlike competitors, CBC is a **true compiler.** It does not token and interpret. It produces efficient, compact, well-written machine code. The compiler produces **position independent code** so that you may put the compiled program anywhere in memory, including into a ROM-pak. Features like automatic restore and the loading of the source program on an error are just samples of the niceties provided.

The Color Basic Compiler features **over 65 commands** and functions, most of which are a subset of Extended Color Basic. Full syntax of each of these commands is supported. Though the compiler is limited to integer variables, all floating point can be done in a BASIC program which calls the compiled program. Passing information from BASIC to compiled programs is very easy.

The new **TRACE** feature allows you to step through a program line by line or to speed through it by pressing R. If an error occurs, the line number is given. Great for debugging! Also added are **multi-dimensional arrays** – string and numeric! **New commands** include DRAW, PLAY, TAB, MID$, INSTR, and more!

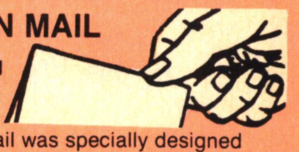
You can **pass any variable to a compiled program and back to BASIC** with the GETV and PUTV commands. You can transfer a string of any size back to BASIC. **Strings are fully supported.** Variable names can be any length with the first two letters being unique. Relations are supported within integer expressions and nested IF/THEN/ELSE statements are allowed. The Color Basic Compiler requires 32K and leaves 16K for user workspace. This is room for a program with up to 200 lines and 100 line references.

With all of its power, the CBC is still easy to use! A comprehensive instruction manual and lots of sample programs are included. Most importantly, CBC has been in use for **over a year, error free.** Our competitors simply cannot compete with the **quality, speed, efficiency,** and completeness of this compiler. Don't try to use anything less than Computerware's Color Basic Compiler!

Requires 32K Disk Disk only $39.95
(Write for a complete list of functions.)

MERGE 'N MAIL

by Cris Erving



Merge 'n Mail was specially designed to do one job and do it well. It is a sophisticated mail list manager with a mail-merge feature that can insert your name and address info into letters created with your word processor.

Merge 'n Mail's 8 preset fields include last name, first name, company name, address, city, state, zip code, and phone number. 12 additional programmable fields allow you to store extra information according to your personal needs. Names are automatically sorted by last name when entered and a zipcode sort is also available. You can store over 2500 records per file; over 800 on a single drive; the files may be on 1 to 4 drives.

Label formats are easy to specify and custom label formats are saved on disk for fast and easy printing. The logical selection feature allows you to specify a subset of your mailing list by any field with six different qualifiers for printing. Printer baud rate, compression and uncompression codes may be changed for your printer.

The mail-merge feature helps you create letters with your word processor and embed mailing list info automatically! It can be used with any ASCII editor including Scribe, Telewriter, Scripsit, and VIP Writer. Merge 'n Mail is sophisticated yet easy to use. If you maintain a mailing list for any purpose, this is a tool that can save you time!

Requires 64K disk Disk only $27.95

PERSONAL FINANCE SYSTEM **by BJ Chambless**

PFS makes it fun and easy to organize, control, and understand your finances. You set a monthly budget, personal chart of accounts, and then enter each transaction. PFS compares your actual monthly expenses with your budget. It gives you personal financial reports of income and expenses with your own accounts. Tax time is so much easier!

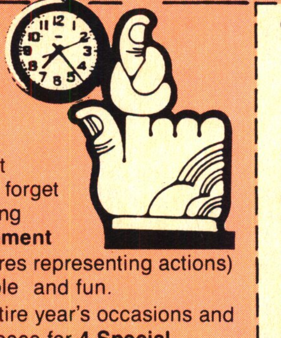
The special investment and loan module helps you calculate details of financial transactions like mortgage payments, principal amounts, amortization tables, interest rates, and more so you can analyze your current and future investments quickly and easily. With PFS you will not only keep your finances organized but can do important analysis as well!

Requires 32K Disk & 80 column printer
Disk only $27.95

DON'T FORGET!

Personal Time Management System and Event Recorder with Memos

by Warren Ulrich III



Need a helpful reminder of that important appointment or special birthday? You won't forget with Don't Forget! You'll actually enjoy getting organized with this **personal time management system.** The Macintosh-like **icons** (or pictures representing actions) make entering your personal schedule simple and fun.

With Don't Forget! you can record the entire year's occasions and daily appointments ahead. Each day has space for **4 Special Occasions, 2 Memos, and hourly notes** for 6 a.m. through 9 p.m. The built-in 51 x 24 upper and lower case hi-res display makes it very easy to read.

You can display or print any daily schedule – or a whole week at a time – so you'll remember every important event. You can even print a blank monthly calendar page with big boxes to scribble notes in!

So use your CoCo's memory and Don't Forget! as your personal secretary. Designed for mouse, joystick, or keyboard entry.

Requires 32K Disk Disk only $27.95

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Signature ____________________

Item	Format	Price

Shipping:	6% Calif. Sales Tax	
Surface — $2 minimum.	COD Add $5	
2% for orders over $100	Shipping*	
Air or Canada — $5 minimum.	TOTAL	
5% for orders over $100		
Checks are delayed for bank clearance		

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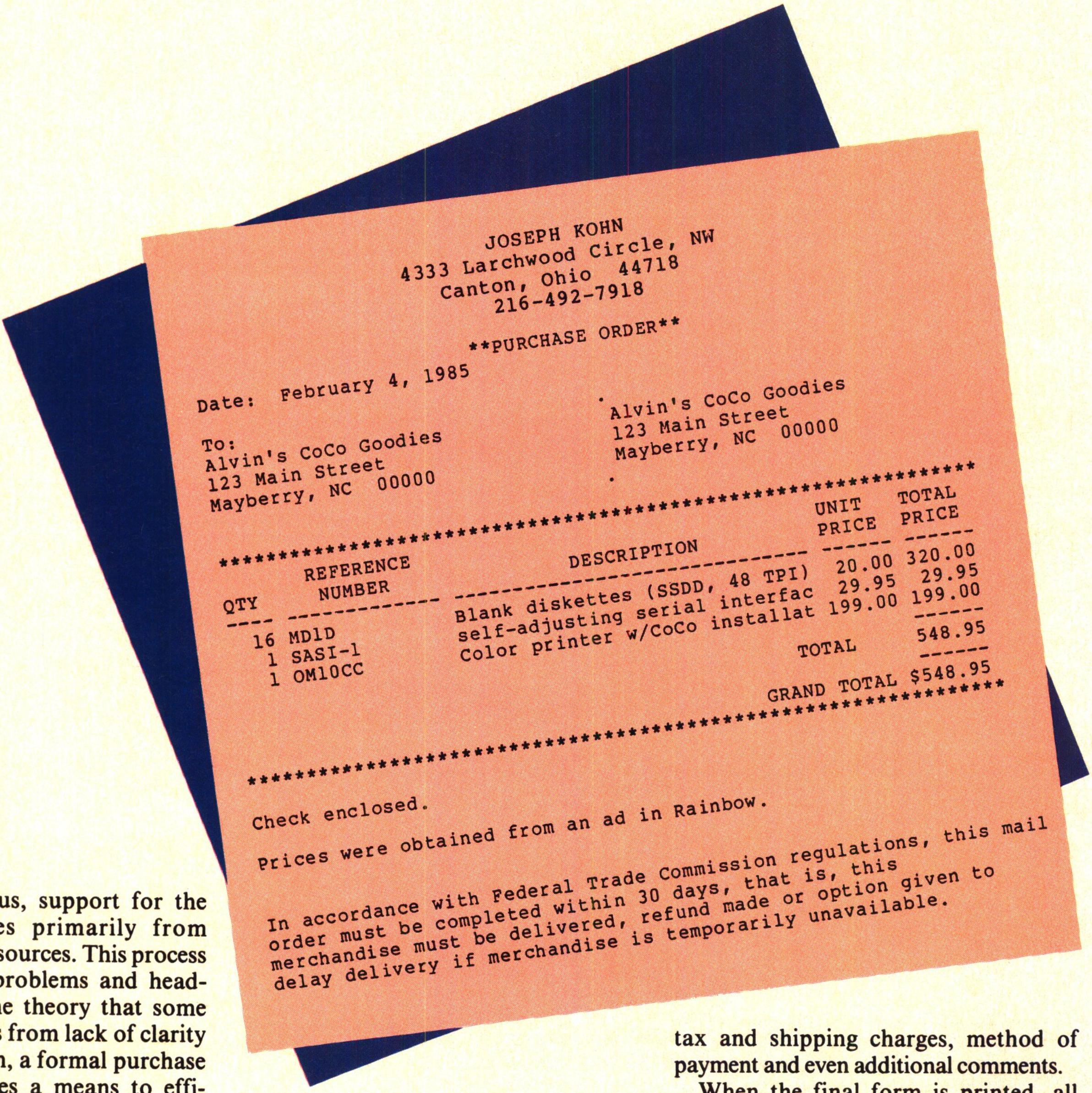
Expedite the mail order process with

PURCHASE ORDER

The Order Recorder



```
                      JOSEPH KOHN
               4333 Larchwood Circle, NW
                  Canton, Ohio  44718
                     216-492-7918

                   **PURCHASE ORDER**

Date:  February 4, 1985
                                  .
                                  Alvin's CoCo Goodies
To:                               123 Main Street
Alvin's CoCo Goodies              Mayberry, NC  00000
123 Main Street                   .
Mayberry, NC  00000
***************************************************************
                                                 UNIT    TOTAL
                                                 PRICE   PRICE
***************************************************************
        REFERENCE              DESCRIPTION       ------  ------
QTY      NUMBER     -------------------------     20.00  320.00
---- -------------  Blank diskettes (SSDD, 48 TPI) 29.95   29.95
  16 MD1D           self-adjusting serial interfac 199.00 199.00
   1 SASI-1         Color printer w/CoCo installat        ------
   1 OM10CC                                               548.95
                                           TOTAL          ------
                                           GRAND TOTAL   $548.95
***************************************************************

***************************************************************

Check enclosed.

Prices were obtained from an ad in Rainbow.

In accordance with Federal Trade Commission regulations, this mail
order must be completed within 30 days, that is, this
merchandise must be delivered, refund made or option given to
delay delivery if merchandise is temporarily unavailable.
```

For most of us, support for the CoCo comes primarily from "mail order" sources. This process may be prone to problems and headaches. Based on the theory that some of the trouble arises from lack of clarity and communication, a formal purchase order form provides a means to efficiently convey your intentions.

(Joseph Kohn is a systems engineer for Goodyear Aerospace in Akron, Ohio. He is interested in graphics and utilities.)

The purchase order program is set up to allow convenient entry of all necessary data via a menu selection. This includes company information, description of the items to be ordered, tax and shipping charges, method of payment and even additional comments.

When the final form is printed, all necessary calculations are made. In addition, the company name and address are double printed to allow one copy to be cut out and used as a mailing label. In order to get the suppliers attention, a notice is printed regarding regulations on mail order purchases.

Listing 1 is intended for universal application on any standard printer (i.e., 10 cpi and 80 characters/line). Lines 290-300 allow for payment by check, VISA or MasterCard. You can easily change this to suit your own financial arrangements. If a charge card is selected, a signature line is also printed. Be sure to change lines 410, 420 and 630 to your own personal data.

Listing 2 adds the "frosting to the cake." The appearance of the final printed purchase order form can be considerably enhanced by exploiting some of the features of the smart printers, e.g., correspondence quality type, bold print and dot graphics. This listing is functionally identical to Listing 1, but changes have been made to include Okidata ML92 control codes to spruce up the printout. Here, lines 440, 450 and 650 will have to be modified to your personal data.

After you get the program running, you may find it educational to go over the print instructions. There is liberal use of the `TAB` and `PRINT USING` functions.

(For anyone having questions, Mr. Kohn may be contacted at 4333 Larchwood Circle, NW Canton, Ohio 44718, phone (216) 492-7918)

200 193
400 234
600 78
END 97

Listing 1: *ORDER 1*

```
10 'PURCHASE ORDER
20 '12AUG84
30 CLEAR5000:DIMQ(50),D$(50),P(5
0),T(50)
40 '-----titles
50 X$(1)="COMPANY INFORMATION":X
$(2)="ITEMS ORDERED":X$(3)="SURC
HARGES":X$(4)="PAYMENT METHOD":X
$(5)="COMMENTS":X$(6)="PRINT":TT
$="PURCHASE ORDER"
60 X$=TT$:GOSUB710:FORI=1TO6:PRI
NTI"- "X$(I):NEXT:PRINT:PRINT"
CHOICE?"
70 GOSUB720:K=VAL(K$):IFK<1 OR K
>6 THEN 70ELSE ON K GOTO 90,150,
230,280,320,380
80 '-----company information
90 X$=X$(1):GOSUB710
100 PRINT"NAME? ":PRINTA$:LINEIN
PUTK$:IFK$<>""THENA$=K$
110 FORI=1TO3:PRINT"ADDRESS LINE
"I"?":PRINTB$(I):LINEINPUTK$:IFK
$<>""THENB$(I)=K$
120 IFK$="" AND B$(I)=""THEN60
130 NEXT:GOTO60
140 '-----items ordered
150 FORI=1TO50:X$=X$(2):GOSUB710
160 PRINT"ITEM"I":":PRINT"QUANTI
TY? "Q(I):LINEINPUTK$:IFK$<>""TH
ENQ(I)=VAL(K$)
170 IFK$=""AND Q(I)=0 THEN60
180 PRINT"REFERENCE NO.?":PRINTR
$(I):LINEINPUTK$:IFK$<>""THENR$(
I)=K$
190 PRINT"DESCRIPTION?":PRINTD$(
I):LINEINPUTK$:IFK$<>""THEND$(I)
=K$
200 PRINTUSING"PRICE EACH? $$###
.##";P(I):LINEINPUTK$:IFK$<>""TH
ENP(I)=VAL(K$)
210 T(I)=P(I)*Q(I):NEXT:GOTO60
220 '-----surcharges
230 X$=X$(3):GOSUB710
240 PRINT"TAX RATE? "TX"%":LINEI
NPUTK$:IFK$<>""THENTX=VAL(K$)
250 PRINTUSING"SHIPPING AND HAND
LING? $$##.##";SH:LINEINPUTK$:IF
K$<>""THENSH=VAL(K$)
260 GOTO60
270 '-----payment method
280 X$=X$(4):GOSUB710
290 PRINT"1-CHECK",,"2-MASTERCAR
D",,"3-VISA":PRINT:PRINT"  CHOIC
E?":GOSUB720
300 K=VAL(K$):IFK<1 OR K>3THEN28
0ELSECC=K:GOTO60
310 '-----comments
320 X$=X$(5):GOSUB710
330 PRINT"PRICE REFERENCE?":PRIN
TPR$:LINEINPUTK$:IFK$<>""THENPR$
=K$
340 FORI=0TO9:PRINT"SPECIAL COMM
ENTS?":PRINTSC$(I):LINEINPUTK$:I
FK$<>""THENSC$(I)=K$
350 IFK$="" AND SC$(I)=""THEN60
360 NEXT:GOTO60
370 '-----printing
380 X$=X$(6):GOSUB710:IF(PEEK(&H
FF22) AND 1)THENCLS4:PRINT@256,"
PRINTER NOT READY!";:GOSUB720:GO
TO380
390 LINEINPUT"DATE? ";D$
400 TT=0
410 PRINT#-2,TAB(34)"JOSEPH KOHN
"
420 PRINT#-2,TAB(30)"1343 Blosso
m Avenue":PRINT#-2,TAB(26)"Redla
nds, California  92373":PRINT#-2
,TAB(34)"714-555-1234"
430 PRINT#-2," ":PRINT#-2,TAB(31
)"**PURCHASE ORDER**"
440 PRINT#-2,TAB(8)"Date:   ";D$:
PRINT#-2," "
450 PRINT#-2,TAB(8)"To:";TAB(41)
".";TAB(74)"."
460 PRINT#-2,TAB(8)A$;TAB(42)A$
470 FORI=1TO3:IFB$(I)<>""THENPRI
NT#-2,TAB(8)B$(I);TAB(42)B$(I):N
```

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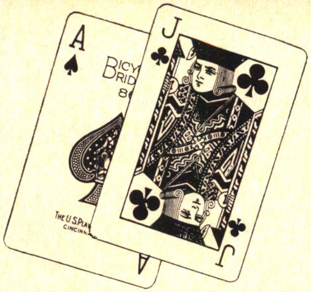
```
EXTELSENEXT
480 PRINT#-2,TAB(41)".";TAB(74)"
."
490 PRINT#-2," ":PRINT#-2,TAB(8)
STRING$(64,"*")
500 PRINT#-2,TAB(15)"REFERENCE";
TAB(58)"UNIT   TOTAL"
510 PRINT#-2,TAB(8)"QTY      NUMB
ER                DESCRIPTION
     PRICE  PRICE "
520 PRINT#-2,TAB(8)"---- -------
------ ------------------------
----- ------ ------"
530 FORY=1TO50
540 IFQ(Y)<>0THENPRINT#-2,USING"
       #### %              % %
                         % ###.##
 ###.##";Q(Y);R$(Y);D$(Y);P(Y);T
(Y):TT=TT+T(Y):NEXT
550 PRINT#-2,TAB(65)"------"
560 PRINT#-2,TAB(55)"TOTAL";:PRI
NT#-2,USING"      ###.##";TT
570 IF TX<>0THEN TN=TX/100*TT:TT
=TT+TN:PRINT#-2,TAB(50);:PRINT#-
2,USING"##.##% TAX     ####.##";T
X,TN
580 IF SH<>0 THEN PRINT#-2,TAB(4
4)"SHIPPING & HANDLING";:PRINT#-
2,USING"  ###.##";SH
590 TT=TT+SH
600 PRINT#-2,TAB(65)"------"
610 PRINT#-2,TAB(52)"GRAND TOTAL
";:PRINT#-2,USING"$$###.##";TT
620 PRINT#-2,TAB(8)STRING$(64,"*
"):PRINT#-2," "
630 PRINT#-2,TAB(8);:IF CC=1 THE
N PRINT#-2,"Check enclosed." ELS
E IF CC=3 THENPRINT#-2,"Charge t
o **VISA** (#1111 1111 1111 1111
  5/85)" ELSE PRINT#-2,"Charge t
o **MASTERCARD** (#1111 1111 111
1 1111  7/85)"
640 PRINT#-2," ":IF PR$<>""THEN
PRINT#-2,TAB(8)"Prices were obta
ined from "PR$".":PRINT#-2," "
650 FORI=0TO9:IFSC$(I)<>""THEN P
RINT#-2,TAB(8)SC$(I):PRINT#-2,"
":NEXTELSENEXT
660 IFCC<>1THENPRINT#-2," ":PRIN
T#-2,TAB(8)"SIGNED"STRING$(30,".
")
670 PRINT#-2," ":PRINT#-2,TAB(8)
"In accordance with Federal Trad
e Commission regulations, this m
ail":PRINT#-2,TAB(8)"order must
be completed within 30 days, tha
t is, this"
680 PRINT#-2,TAB(8)"merchandise
must be delivered, refund made o
```



Blackjack Dealer
Feeler Dealer

These two programs help you develop your Blackjack skill and strategy. In **Blackjack Dealer,** the computer deals the cards and plays the dealer's hand against you. **Feeler Dealer** enables you to test your strategy by playing the desired number of hands using your techniques & tendencies. A great teacher for new Blackjack players and a valuable tool for the veteran player. Both programs included. 32K Extended. Tape - $24.95. Disk or Amdek - $29.95.

EAGLE

A graphic-enhanced lunar lander simulator. The pilot breaks out of lunar orbit and attempts a soft landing on the lunar surface. Joysticks control thrust and craft altitude and information is continually displayed on horizontal and vertical velocities, acceleration values, vertical and horizontal distances from target, fuel consumption and much more. On advanced levels, problems such as fuel leaks and computer screen failures can provide hair-raising final approaches. Disk version allows choice of landing site between Mars and Earth's moon. Takeoffs from the surface can be made and the upper stage placed back in orbit. The simulation is as educational as it is fun and exciting. Superb graphics! A great tool for that future astronaut or physicist. 32K, 2 joysticks required. Tape - $24.95. Disk or Amdek - $29.95.

Sketchpad

A graphics drawing program designed to provide the computer hobbyist with easy manipulation of the powerful graphics capabilities of the CoCo. Advanced programmers can design graphics screens and characters for Basic and ML programs and games. Sketchpad was used to create the graphics for "Eagle" (see above). 32K, 2 Joysticks and disk drive required. Disk or Amdek - $29.95.

Testmaker

Menu-driven series that creates mult. choice & T/F tests. Output to screen or printer. 32K Disk, $29.95.

Maycode

A 6809 Disassembler. Maycode will read the machine code from memory and convert it to standard 6809 Assembly Language Mnemonics. Output can be sent to screen, printer, cassette, or diskette. The output to cassette or diskette may be reloaded into EDTASM+ for modification or re-assembly. 16K min. Tape - $24.95. Disk - $29.95.

TDIR

A menu-driven tape directory. Allows complete directory control. 16K. Tape, $24.95.

Alphacopy

It is nice to have an alphabetized disk directory, but if that should crash, it doesn't help tell you where the programs are. Alphacopy will fully alphabetize your disk; that is, write the programs in alphabetical order. Each program will be written on the same or consecutive sectors, thus making rebuilding of the disk much easier with the other currently available disk "zapping" utilities. ALPHACOPY will also allow you to format disks up to 80 tracks if your drive allows, thus giving you more space to store programs per disk. 32K. Disk or Amdek - $19.95.

The Digestive System

An educational quiz game for 2 players that covers different aspects of the human digestive system. Each question is assigned a point value relative to its difficulty. A fun way to learn about a not-so-fun subject. 16K.

The Circulatory System

Using the same format as "The Digestive System," this program covers the heart, lungs, veins, arteries, blood, etc. 16K.

Both Only:
Tape - $19.95. Disk or Amdek - $24.95.

History From 1607 To 1976

On two 16K non-extended tapes. For 1-4 people. Informative & fun way to learn important dates in world history. Written for students by a teacher. Tape $19.95. Disk or Amdek - $24.95.

Stars Of America

Education should be fun - this program is just that! This tutorial uses 25 of the superstars of American history, from George Washington to Ronald Reagan.

The Civil War

A challenging two - person game. Questions cover Carpet Baggers to the Battle of Vicksburg. Points are assigned according to the difficulty of the question, scores are displayed throughout the game.

Both Only: Tape 19.95. Disk 24.95

Treasure Hunt

A graphics text adventure. You walk with our graphics character through desert, mountains and city to seek the illusive treasure of gold. Super graphics with a person who walks with you at each turn. 64K. Disk & Amdek only - $29.95.

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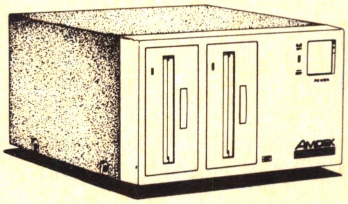

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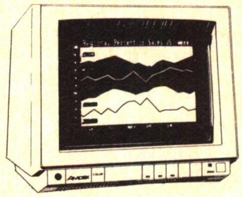

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```
r option given to":PRINT#-2,TAB(
8)"delay delivery if merchandise
 is temporarily unavailable."
690 GOTO60
700 '-----subroutines
710 X=LEN(X$):CLS:Y=INT((32-X)/2
):PRINTSTRING$(Y,"*")X$STRING$(3
2-Y-X,"*"):RETURN
720 K$=INKEY$:IFK$=""THEN720ELSE
RETURN
```

Listing 2 (For Okidata 92 printers): *ORDER 2*

First, type in lines 10 through 380 of Listing 1. Then, change the `GOSUB710` in lines 60, 90, 150, 230, 280, 320 and 380 to `GOSUB730`. Also change the `GOSUB720` in lines 70, 290 and 380 to `GOSUB740`.

After making these changes, type in the rest of the program, beginning with Line 390, as follows:

```
390 POKE150,18:LINEINPUT"DATE? "
;D$
400 FORZ=1TO2:TT=0
410 PRINT#-2,CHR$(27)"5";
420 PRINT#-2,CHR$(24)CHR$(20)STR
ING$(55," ")"1?";
430 PRINT#-2,CHR$(27)"%C096"CHR$
(28)CHR$(31);
440 PRINT#-2,STRING$(14," ")CHR$
(27)"1""JOSEPH KOHN"
450 PRINT#-2,TAB(10)"1343 Blosso
m Avenue":PRINT#-2,TAB(6)"Redlan
ds, California  92373":PRINT#-2,
TAB(14)"714-555-1234"
460 PRINT#-2,CHR$(30)CHR$(31)CHR
$(27)"0":PRINT#-2,TAB(7)"**PURCH
ASE ORDER**"CHR$(10)CHR$(30)
470 PRINT#-2,"Date:  ";D$:PRINT#
-2," "
480 PRINT#-2,"To:";TAB(33)CHR$(3
)CHR$(127);:FORI=0TO201:PRINT#-2
,CHR$(1);:NEXT:PRINT#-2,CHR$(127
)CHR$(3)CHR$(2)
490 PRINT#-2,A$;TAB(33)" "CHR$(2
7)"T"A$CHR$(27)"I"
500 FORI=1TO3:IFB$(I)<>""THENPRI
NT#-2,B$(I);TAB(33)" "CHR$(27)"T
"B$(I)CHR$(27)"I":NEXTELSENEXT
510 PRINT#-2,TAB(33)CHR$(3)CHR$(
127);:FORI=0TO201:PRINT#-2,CHR$(
64);:NEXT:PRINT#-2,CHR$(127)CHR$
(3)CHR$(2)
520 PRINT#-2," ":GOSUB750
530 PRINT#-2,TAB(7)"REFERENCE";T
AB(50)"UNIT   TOTAL"
540 PRINT#-2,CHR$(27)"C""QTY "CH
R$(27)"D "CHR$(27)"C    NUMBER
 "CHR$(27)"D "CHR$(27)"C
  DESCRIPTION         "CHR$(27)"
D "CHR$(27)"CPRICE "CHR$(27)"D "
CHR$(27)"CPRICE "CHR$(27)"D"
550 FORY=1TO50
560 IFQ(Y)<>0THENPRINT#-2,USING"
#### %           % %
                % ###.## ###.##"
;Q(Y);R$(Y);D$(Y);P(Y);T(Y):TT=T
```

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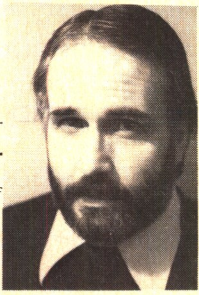
```
T+T(Y):NEXT
570 PRINT#-2,TAB(57)"------"
580 PRINT#-2,TAB(47)"TOTAL";:PRI
NT#-2,USING"        ###.##";TT
590 IF TX<>0THEN TN=TX/100*TT:TT
=TT+TN:PRINT#-2,TAB(42);:PRINT#-
2,USING"##.##% TAX     ####.##";T
X,TN
600 IF SH<>0 THEN PRINT#-2,TAB(3
6)"SHIPPING & HANDLING";:PRINT#-
2,USING"  ###.##";SH
610 TT=TT+SH
620 PRINT#-2,TAB(57)"------"
630 PRINT#-2,TAB(44)CHR$(27)"TGR
AND TOTAL";:PRINT#-2,USING"$$###
.##";TT:PRINT#-2,CHR$(27)"I";
640 GOSUB750:PRINT#-2," "
650 IF CC=1 THEN PRINT#-2,"Check
 enclosed." ELSE IF CC=3 THENPRI
NT#-2,"Charge to **VISA** (#1111
 1111 1111 1111  5/85)" ELSE PRI
NT#-2,"Charge to **MASTERCARD**
(#1111 1111 1111 1111  7/85)"
660 PRINT#-2," ":IF PR$<>""THEN
PRINT#-2,"Prices were obtained f
rom "PR$".":PRINT#-2," "
670 FORI=0TO9:IFSC$(I)<>""THEN P
RINT#-2,SC$(I):PRINT#-2," ":NEXT
ELSENEXT
680 IFCC<>1THENPRINT#-2,CHR$(27)
CHR$(11)"03":PRINT#-2,"SIGNED"ST
RING$(30,95)
690 PRINT#-2,CHR$(11)"1"CHR$(29)
"In accordance with Federal Trad
e Commission regulations, this m
ail order must be completed with
in 30 days,":PRINT#-2,"that is,
this merchandise must be deliver
ed, refund made or option given
to delay delivery if ";
700 PRINT#-2,"merchandise":PRINT
#-2,"is temporarily unavailable.
"
710 PRINT#-2,CHR$(12);:NEXTZ:GOT
O60
720 '-----subroutines
730 X=LEN(X$):CLS:Y=INT((32-X)/2
):PRINTSTRING$(Y,"*")X$STRING$(3
2-Y-X,"*"):RETURN
740 K$=INKEY$:IFK$=""THEN740ELSE
RETURN
750 PRINT#-2,CHR$(3);:FORI=0TO62
:PRINT#-2,CHR$(8)CHR$(28)CHR$(62
)CHR$(127)CHR$(62)CHR$(28);:NEXT
:PRINT#-2,CHR$(8)CHR$(3)CHR$(2):
RETURN
```



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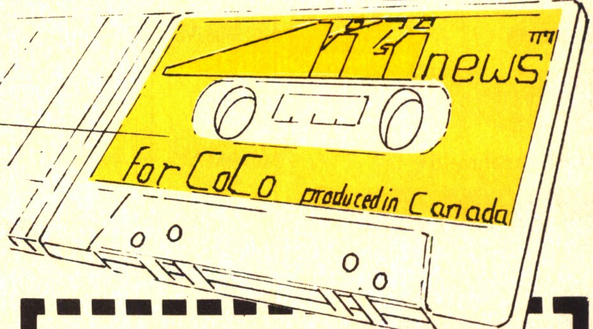

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PRINTER COMPARISON CHART

Here's a list of some of the more popular printers for home computers like the CoCo. Most of these are dot matrix impact printers (the kind that print with a ribbon on plain paper); there are also some daisy wheel printers, four-color printers (these use four colors of ink to generate several colors of printing) and thermal printers (including both thermal-transfer printers that use plain paper and machines that require specially coated paper).

A few old favorites like the Gemini-10X and 15X, and Radio Shack's DMP-100 and CGP-115 are no longer on the market and aren't on this list.

You'll notice that most of these printers (except for the Tandy/Radio Shack line) have internal serial interfaces available as extra-cost options. You may still want to use an external serial-to-parallel interface unit for greater flexibility, since internal serial interfaces usually are limited to one or two Baud rates and often require taking the top off to change rates.

— Ed Ellers

Dot Matrix Printers	Carriage	Tractor	Friction	Speed CPS	Bidirectional	Bit-image Graphics	Near-letter-quality Mode	Print Head Pins	Parallel	Serial
C. Itoh ProWriter 7500	NORMAL	YES	YES	105	YES	YES	NO	9	YES	OPTIONAL
C. Itoh ProWriter 8510B	NORMAL	YES	YES	120	YES	YES	NO	9	YES	OPTIONAL
C. Itoh ProWriter 1550B	WIDE	YES	YES	120	YES	YES	NO	9	YES	OPTIONAL
Epson RX-80	NORMAL	YES	NO	100	YES	YES	NO	9	YES	OPTIONAL
Epson RX-80 F/T	NORMAL	YES	YES	100	YES	YES	NO	9	YES	OPTIONAL
Epson RX-100	WIDE	YES	YES	100	YES	YES	NO	9	YES	OPTIONAL
Epson FX-80	NORMAL	PIN*	YES	160	YES	YES	NO	9	YES	OPTIONAL
Epson FX-100	WIDE	PIN*	YES	160	YES	YES	NO	9	YES	OPTIONAL
Okidata Microline 84	NORMAL	YES	YES	200	YES	YES	YES	9	YES	OPTIONAL
Okidata Microline 92	NORMAL	YES	YES	160	YES	YES	YES	9	YES	OPTIONAL
Okidata Microline 93	WIDE	YES	YES	160	YES	YES	YES	9	YES	OPTIONAL
Okidata Microline 182	NORMAL	YES	YES	120	YES	NO	NO	9	YES	OPTIONAL
Star Micronics SG-10	NORMAL	YES	YES	120	YES	YES	YES	9	YES	OPTIONAL
Star Micronics SG-15	WIDE	YES	YES	120	YES	YES	YES	9	YES	OPTIONAL
Tandy/Radio Shack DMP-105	NORMAL	YES	YES	80	YES	YES	NO	9	YES	YES
Tandy/Radio Shack DMP-110	NORMAL	YES	YES	50	NO	YES	NO	8	YES	YES
Tandy/Radio Shack DMP-120	NORMAL	YES	YES	120	YES	YES	NO	9	YES	YES
Tandy/Radio Shack DMP-430	WIDE	YES	YES	180	YES	YES	YES	18	YES	YES

*tractor optional

Daisy Wheel Printers

	Carriage	Tractor	Speed CPS	Bidirectional	Parallel	Serial
Brother HR-25[1]	WIDE	OPTIONAL	23	YES	YES	OPTIONAL
Silver Reed EXP 400	NORMAL	OPTIONAL	12	YES	YES	NO
Silver Reed EXP 500	NORMAL	OPTIONAL	16	YES	YES	NO
Silver Reed EXP 550	WIDE	OPTIONAL	19	YES	YES	OPTION
Tandy/Radio Shack DWP-210	WIDE	OPTIONAL	18	YES	YES	YES

[1] Also has red ribbon

Thermal Printers

	Carriage	Friction	Tractor	Speed CPS	Bidirectional	Bit-image Graphics	Print Head Pins	Parallel	Serial
Brother HR-5	NORMAL	YES	NO	30	YES	YES	9	YES	OPTIONAL
Tandy/Radio Shack TP-10[1]	4⅛″	YES	NO	30	NO	NO	8	NO	YES
Tandy/Radio Shack TRP-100[2]	NORMAL	YES	NO	50	YES	YES	9	YES	YES

[1] Requires special thermal paper
[2] Can operate on batteries

Four-Color Printers

	Carriage	Friction	Tractor	Print Method	Speed CPS	Bidirectional	Near-letter-quality Mode	Print Head Pins	Parallel	Serial
C. Itoh ProWriter 8510S/SC	NORMAL	YES	YES	RIBBON	180	YES	YES	9	YES	OPTIONAL
C. Itoh ProWriter 1550S/SC	WIDE	YES	YES	RIBBON	180	YES	YES	9	YES	OPTIONAL
Epson JX-80	NORMAL	YES	YES	RIBBON	160	YES	NO	9	YES	OPTIONAL
Tandy/Radio Shack CGP-220	NORMAL	YES	NO	INK JET	37	YES	NO	8*	YES	YES

*equivalent

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- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

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SCHOOL IS IN THE HEART OF A CHILD

4K

Wandering Star Finds A Gourmet Oasis

By Bob Albrecht and Ramon Zamora
Rainbow Contributing Editors

"School Is In The Heart Of A Child" is for parents of quite young children. We want to help you work and play with your 3- to 8-year-old child and learn to use computers as a joyful family experience. We suggest ways to use the home computer as another means to encourage your child's independence, growth and control over his own life. See the pride on her face as she directs the computer to do what she selects with deliberation. See her head gears switch to "on" as she progresses step by step with your presence and caring guidance. We will explore (we hope, with your help) the following:

- Specific "teaching" techniques so the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related environments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must!): call the librarian for information; watch TV together and discuss it; work together as volunteers in a community project; take a winter awareness walk .
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge and share our experiences as we learn from our children.

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(Well-known author Bob Albrecht also writes the "GameMaster's Apprentice" feature for THE RAINBOW *each month. Ramon Zamora is author and co-author of several books, co-founder of Computer Town USA!, and currently designing computer games for kids at Child Ware Corp. in Menlo Park, Calif.)*

Last time, we introduced Wandering Star, who wanders about the cosmic oases eating cosmic dust. Eventually, she may wander off the screen (cosmic oasis) and disappear into the cosmic desert.

Well, Wandering Star wandered in the cosmic desert for 40 eons. She became very hungry. Then one day she discovered a gourmet oasis. This oasis is rich in gourmet delights: short-tailed cosmic dust (.), long-tailed cosmic dust (,) and cosmic escargot (@).

Gratefully, Wandering Star explores the gourmet oasis, savoring the gourmet delights. She intends to stay until she consumes every delectable cosmic tidbit.

Listing 1: *OASIS*

```
3 N RN = RN - 1
100 REM**WANDERING STAR SCH 13-1
110 CLS
199 '
200 REM**GOURMET OASIS
210 MENU$ = ".......,,@"
220 FOR K=1 TO 100
230 : GD = RND(10)
240 : GD$ = MID$(MENU$,GD,1)
250 : PRINT @RND(510), GD$;
260 NEXT K
299 '
300 REM**WANDERING STAR APPEARS
310 WS$ = "*"
499 '
```

```
500 REM**KEEP HER IN THE OASIS
510 IF CN<0  THEN CN = 0
520 IF CN>31 THEN CN = 31
530 IF RN<0  THEN RN = 0
540 IF RN>15 THEN RN = 15
550 IF 32*RN+CN=511 THEN 410
599 '
600 REM**WANDERING STAR WANDERS
610 PRINT @SP, " ";
620 R=RN: C=CN: SP=32*R+C
630 PRINT @SP, WS$;
640 SOUND RND(255), 1
650 FOR ZZ=1 TO 20: NEXT ZZ
699 '
700 REM**GOTO DIRECTION SELECTOR
710 GOTO 410
```

Under the benevolent guidance of this program, Wandering Star stays in the gourmet oasis. Sometimes she seems to linger at, or bump along, an edge of the oasis. Perhaps she is curious about what is out there in or beyond the cosmic desert. Will she go adventuring again?

Number Patterns

We began with simple arithmetic and geometric progressions defined by two numbers entered by someone using the keyboard.

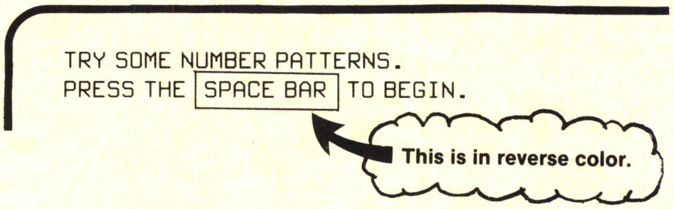
These programs are OK if someone enters the two numbers that define the pattern and another person plays the "game." But, the person who defines the pattern must hover near the computer to start things again when the second person sees the pattern and gets bored.

Let's write a program so the TRS-80 picks the first number and the add-on number at random between limits.

Listing 2: *PATTERNS*

```
100 REM**NMBR PATTERNS SCH 13-2
110 CLS
120 PRINT "TRY SOME NUMBER PATTE
RNS.": PRINT
130 PRINT "PRESS THE spacebar TO
 BEGIN."
140 Z=RND(0):IFINKEY$=""THEN140
199 '
200 REM**RANDOM STARTING NUMBERS
210 S = RND(10)
220 A = RND(10)
230 CLS
299 '
300 REM**SHOW 'LATEST' NUMBER
310 PRINT @448, S
320 PRINT
399 '
400 REM**COMPUTE NEXT NUMBER
410 S = S + A
499 '
510 PRINT @480, "FOR NEXT NUMBER
, PRESS spacebar"
520 PRINT "TO START OVER, PRESS
clear KEY";
530 K$=INKEY$:IF K$="" THEN 530
540 IF K$=" " THEN 310
550 IF K$=CHR$(12) THEN 110
ELSE 530
599 END
```

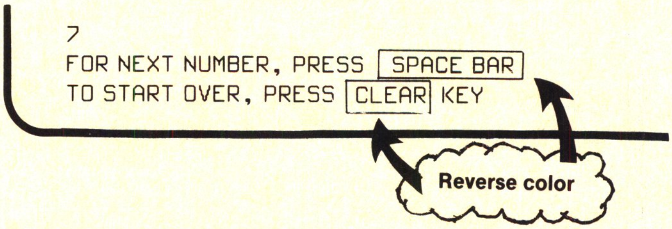
When you RUN the program, it begins like this.



```
TRY SOME NUMBER PATTERNS.
PRESS THE SPACE BAR TO BEGIN.
```

This is in reverse color.

While the CoCo is waiting for someone to press the space bar, it is executing Line 140 many times. We do this so the CoCo will (probably) start with a different pair of starting numbers each time you load and run the program. Press the space bar and you might see this.



```
7
FOR NEXT NUMBER, PRESS SPACE BAR
TO START OVER, PRESS CLEAR KEY
```

Reverse color

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Press the space bar and perhaps you'll see:

What values of 'S' and 'A' did the CoCo pick?

```
7
9
FOR NEXT NUMBER, PRESS SPACE BAR
TO START OVER, PRESS CLEAR KEY
```

This program is much like *Number Patterns* (February 1985), except the pattern is defined by the CoCo in lines 210 and 220.

210 S = RND(10)	The first number (S) is a random integer, 1 to 10.
220 A = RND(10)	The add-on number (A) is a random integer, 1 to 10.

If you don't like our limits (1 to 10), change them! Enter the program and type `RUN`. The two numbers that define the pattern are random, within limits ($1 < S < 10$ and $1 < A < 10$). The pattern, once the two defining numbers have been chosen, is completely determined.

You can easily change the program so the CoCo shows geometric sequences instead of arithmetic sequences. Change only Line 410, like this:

```
410 S = S*A
```

You may also wish to change lines 210 or 220 to put different limits on the possible values of 'S' an 'A.' For example:

```
210 S = RND(2)
220 A = RND(3)
```

Now, the possible values of 'S' will be 1 or 2. The possible values of 'A' will be 1, 2 or 3.

Your turn! Complete the following:

1) Suppose we change lines 210 and 220 as follows:

```
210 S = RND(5) - 1
220 A = RND(4)
```

What are the possible values of 'S'? ________

What are the possible values of 'A'? ________

2) Write lines 210 and 220 so the possible values of 'S' are 1, 2, 3, 4, 5 or 6, and the possible values of 'A' are 2, 3 or 4.

210 ____________

220 ____________

Color LOGO

No one has responded to our Color LOGO. So, unless we hear from you otherwise, we are dropping the Color LOGO section.

DragonSmoke

DragonSmoke is our monthly newsletter about new ways to learn, including computers, role playing games, play-by-mail games, COPY ME stuff, public domain instructional materials, software for beginners, and our own play-by-mail game, *DragonFun*.

DragonFun is a play-by-mail role playing game for beginners. It is nonviolent and features cooperation, exploration, problem-solving and story-telling. How to play is described in the February 1985 issue of *DragonSmoke*. For a free copy, send a self-addressed, stamped envelope to *DragonSmoke*, P.O. Box 7627, Menlo Park, CA 94026.

One-Liner Contest Winner . . .

This is a handy one-liner that generates shopping lists and prints them on the printer. Just enter the name of the item and then a four-digit price (such as 01.92, 20.99 or 00.56). Always remember to get your printer ready before running the program.

The listing:

```
1 DIMA$(100),B$(100):CLS:PRINT"S
HOPPING LIST GENERATOR":PRINT"BY
 KEITH M. SCHULER":PRINT:FORC=1T
O100:PRINT"ITEM #";C;:INPUTA$(C)
:INPUT"PRICE(##.##)";B$(C):IFA$(
C)<>""THENPRINT#-2,"____   $";B$(
C);"  ";A$(C):NEXT ELSEPRINT"SHO
PPING LIST COMPLETE"
```

Keith Schuler
Merrit Island, FL

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

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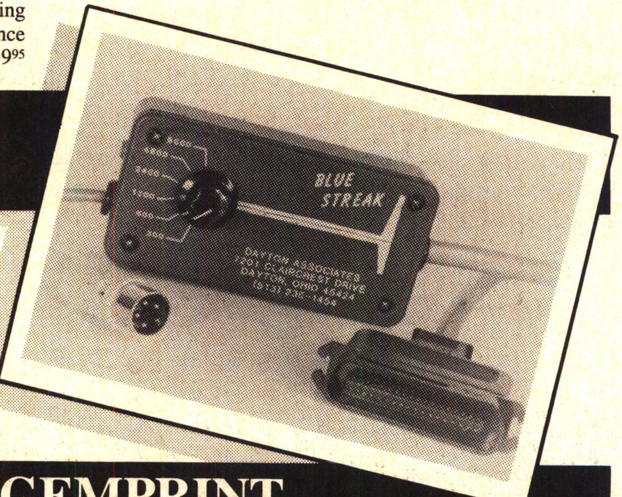

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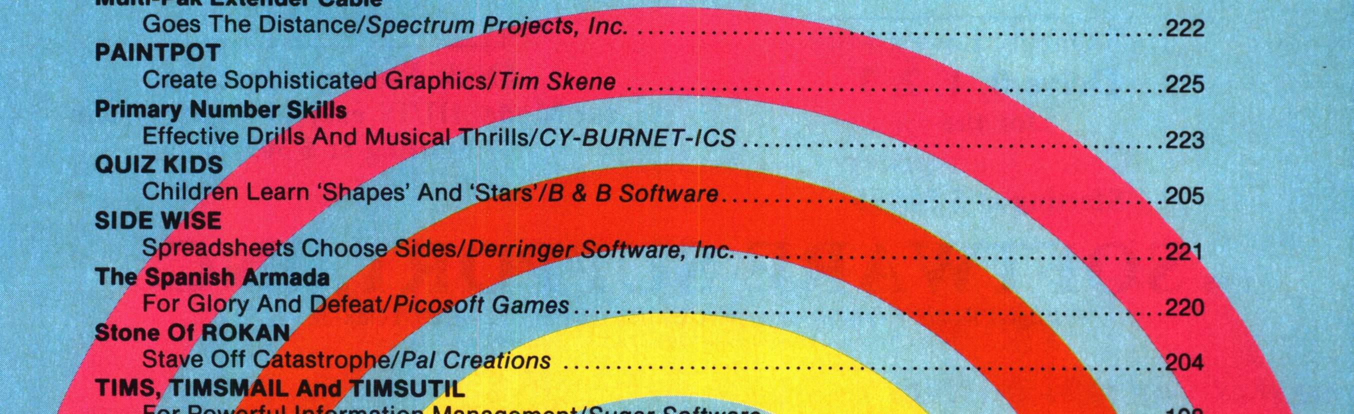

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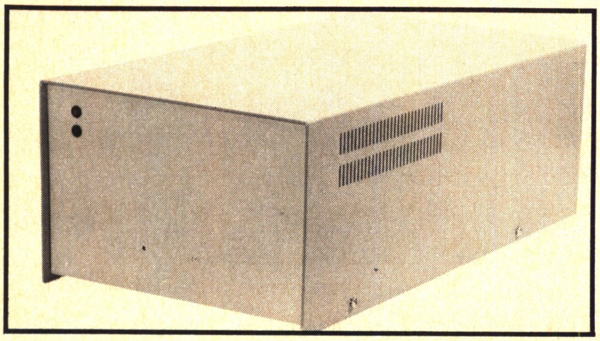

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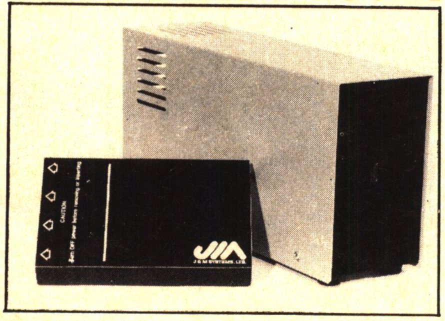

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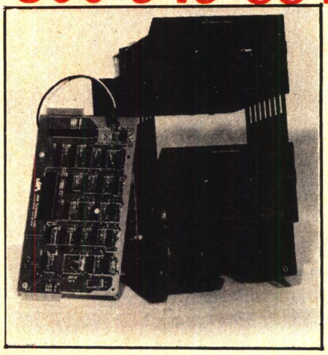

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This month the *Seal of Certification* has been issued to:

Battle of the Bulge, a 32K strategic war game which recreates Germany's last desperate gamble of WW II. Echoing the weather's dense fog, the Allied intelligence knows not the Axis' strength nor objectives. Ark Royal Games, P.O Box 14806, Jacksonville, FL 32238, cassette $25.95, disk $28.95

Battle for Tunis, a 32K strategic war game depicting North Africa in 1943. Patton has been recalled to Europe to plan the invasion of Sicily and Rommel is in Berlin. You have the opportunity to replace either of history's greatest generals in the challenge for control of Tunisia. In a one-player game against CoCo you must control the Axis forces and do what Rommel's veterans couldn't: Hold Tunis! Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette $24.95, disk $27.95

CINC PAC — Battle of Midway, a 32K war game depicting the most famous and perhaps important battle in the history of the United States Navy. Featuring Hi-Res graphics and 75% ML, *CINC PAC* calls upon you to control as many as 41 separate units on screen at one time. Command the Yorktown, the Hornet and the Enterprise to search and attack the Akagi, the Soryu and the Yamato, among others. Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette $27.95, disk $30.95

Guadalcanal, a 32K strategic war game depicting the August 1942 first offensive of WW II by America's leathernecks. You command the Marines to expand the perimeter, capture Japanese camps, sortie air cover, search and capture food and equipment. Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette $24.95, disk $27.95

River Crossing, a 32K game module for *Company Commander Version 2.0*. This World War II game module features new terrain features and 12 scenarios depicting historic battle sites; must be played as an expansion of *Company Commander*. Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette or disk $19

ACDITS, Aurora Computing Disk Information and Transfer System, a 32K disk utility featuring the creation of a catalog of disk files which can be output to the screen or to a printer with support functions of search, delete and append, and transfer of files from disk to tape or tape to disk. Aurora Computing, 49 Brookland Avenue, Aurora, Ontario, Canada L4G 2H6, disk $19.95

CoCo Talker, a 32K speech system requiring the Radio Shack Speech Pak which features direct keyboard speech, speech plus phonemes and building text from keyboard. Computerware, P.O. Box 668, Encinitas, CA 92024, cassette $21.95, disk $24.95 plus $2 S/H

Databank Manager, a database management system for OS-9 and other 64K users. Capabilities include user-definable display screens, record formats, calculated fields, sort sequences, selection criteria and report formats. Computerware, P.O. Box 668, Encinitas, CA 92024, disk $79.95 plus $2 S/H

Dungeon Quest, a 32K graphics Adventure requiring a joystick. In this scenario you are Broderic, a young man seeking his fortune in the world. Tales and legends reach your ears of the late King Darius' bequeath: "Whomsoever can possess my crown shall rule my Kingdom." The crown has never been found, yet the King's decree stands. Despite the fact that all previous questers have never returned, you, Broderic, enter the King's dungeon keep. Glory awaits. Computerware, P.O. Box 668, Encinitas, CA 92024, cassette $24.95, disk $27.95 plus $2 S/H

Franchise, a 64K ECB simulation requiring a joystick, wherein you've just opened "Frank's," a fast-food restaurant. Can you spend wisely enough on food, equipment, salaries and advertising to realize your dream of a chain of 15 "Frank's"? Computerware, P.O. Box 668, Encinitas, CA 92024, cassette $24.95, disk $27.95 plus $2 S/H

Merge 'n' Mail, a 64K utility requiring one disk drive to maintain, merge and print mail list information. The eight preset fields include last name, first name, company name, address, city, state, ZIP code and phone number. Twelve additional programmable fields allow the storing of extra information according to your personal needs. Computerware, P.O. Box 668, Encinitas, CA 92024, disk $27.95 plus $2 S/H

Personal Finance System, a 32K ECB disk financial utility requiring a disk drive and an 80-column printer. Possible are balancing a checkbook and comparison of actual expenses and your budget. Also included is an investment and loan module to help calculate mortgage payments, principal amounts, amortization tables and interest rates. Computerware, P.O. Box 668, Encinitas, CA 92024, disk $27.95 plus $2 S/H

Vox Chess, a 32K Hi-Res graphics ML talking chess game with 24 levels of play. Designed to use *The Voice* by Speech Systems or *Spectrum Voice Pak* by Spectrum Projects of *Real Talker* by Colorware. Vox Chess will also work silently without a voice synthesizer and is for beginning or intermediate chess enthusiasts. Computerware, P.O. Box 668, Encinitas, CA 92024, cassette $21.95, disk $24.95 plus $2 S/H

Metric Mind, a 16K ECB program designed to help students learn metric conversions. Features include conversion tables, metric prefix table, simple word problems for practicing conversion and estimating directly in metric units and five skill levels. Creative Technical Consultants, P.O. Box 652, Cedar Crest, NM 87008, cassette $17.95

Count to 100, a 32K ECB learning tool for preschoolers utilizing *The Voice* speech synthesizer. Using the numeric keys on the computer, the student inputs the numbers and they appear on the screen in large graphic displays in five horizontal rows of five numerals per row. With *The Voice*, CoCo will speak the correct response with the numeral displayed. Cassette comes with a non-talking version for 16K ECB. CYBURNET-ICS, 5705 Chesswood Drive, Knoxville, TN 37912, cassette $29.95, disk $32.95 plus $2 S/H

Golf Handicaps, a 32K sports utility to compute and print golf handicaps for either individuals or teams. Designed for league play or multiple courses, it has provision for different course ratings for men and women. Printouts for each player on a single line include gross and net scores for last play, course rating, handicap and optional team standings. Handicaps are computed per Northern California Golf Association rules. Don Hug, 1111 Terra Way, Roseville, CA 95678, cassette $35, disk $39

Missile Math, a 32K ECB tutorial game program designed to aid elementary level students in their use of addition. Problems are displayed on screen as a missile is fired at a shielded target. The object of the game is to answer the problem correctly before the missile strikes the shield. There are 10 levels of difficulty ranging from simple addition (one digit) to complex addition (four digits with carries). MESA, Middletown High School, Valley Road, Middletown, RI 02840, cassette $24, disk $26 plus $2.50 S/H

Practical Programming In PASCAL: An Introduction To Programming, written by Kent Porter, this volume includes explanations of PASCAL's syntax, index for quick reference and model programs. New American Library, 1633 Broadway, New York, NY 10019, $14.95

File 64, a 64K ECB data management system to capitalize on 64K of memory with user-definable fields (up to five), search, sort, modify, add, delete, save on tape, display or print. Owls Nest Software, P.O. Box 579, Ooltewah, TN 37363, cassette $24.95

Fundgraf, a 16-32K stock market analysis program which graphs a fund's progress, superimposes for comparison, i.e., a line of constant percent growth or a graph of any other fund or stock, calculates over any time span the percent change and the moving average, and indicates buy and sell signals. Parsons Software, Dept. G, 118 Woodshire Drive, Parkersburg, WV 26101, disk $69.95 plus $2 S/H

How To Use Your Radio Shack Printer, a book by William Barden, Jr. which includes chapters on printer basics, printing text and graphics. Functions covered are forms printing, logo design, font generation, figure creation, proportional spacing, and high resolution graphics. Radio Shack stores nationwide, $14.95

Eagle, a 32K Simulation requiring two joysticks which recreates a lunar landing. Constant monitoring of 10 gauges displaying horizontal and vertical velocities, acceleration values, distance and fuel consumption are necessary as well as joystick control of the craft's pitch, thrust and yaw. Saguaro Software, 7331 E. Beverly, Tucson, AZ 85710, cassette $24.95, disk $29.95

Space Web, a 32K arcade requiring one joystick. This Hi-Res strategy game pits your ship against the rigors of hyperspace as you strive to escape the cubes of energy which seek your entrapment. Only by bouncing off the walls of the web and changing all sides to one color can you escape. Each level of play poses a time limit. Spectacular Software, P.O. Box 363, Mansfield Center, CT 06250, cassette or disk, $19.95 plus $1.50 S/H

CoCo Freeze Frame, a "pause control" switch for the CoCo that freezes any program at any stage of progress. Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, $19.95 plus $3 S/H

Multipak Extender Cable, a shielded two-foot extension cable for the Tandy Multi-Pak Interface, the BASIC Technology Interface or the PBJ Expansion Bus. Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, $39.95 plus $3 S/H

Color Tape Manager, a 32K ECB programming utility which can merge BASIC and ML programs, append ML to BASIC programs or convert ML programs to BASIC data statements which can be loaded or combined with your BASIC program. Also possible is the display of start, end and execute address of ML programs, Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, cassette or disk $24.95

Color Disk Manager, a 32K utility to handle disk related needs such as selective initializations, verifies, backups and repairs. Compatible with 64K, it gives an allocation table map with granules cross-referenced to tracks and sectors; dumps memory to the screen in ASCII; transfers programs from tape to disk; displays the start, end and execute addresses of ML programs and allows you to change to origin of ML programs. Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, disk $34.95

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REVIEWING REVIEWS

MLBASIC

Editor:

I would like to comment on a review that was made by James Kriz on the BASIC compiler called *MLBASIC.* A review of any major system software package, such as a BASIC compiler, should give the reader information as to the features and operation of that product. The review should include information that gives both the positive and negative aspects of that product. When a biased review is made, the information given is not accurate and therefore a second or third opinion is needed. This is the case with the review of *MLBASIC.*

The first and most important comment, since it sets the attitude of the rest of the review, is where Mr. Kriz says " . . . the Color Computer finally had a complete BASIC compiler that would be comparable to the Microsoft BASIC compiler for the IBM PC." He then regrets to conclude that we must still wait for that ultimate compiler. My objections are that one should not compare a software package with another that is five times the cost, and must run on a more expensive and sophisticated computer. That is like comparing apples with oranges.

It was wrong of Mr. Kriz to assume that interpreter BASIC programs are directly compatible with *MLBASIC* syntax. Nowhere in the manual is this stated or implied. Furthermore, the syntax is very similar in some cases and the same in others. This means that existing programs can be compiled if they are modified to the correct syntax.

The reason for dimensioning all strings was to save space and speed up the string manipulations considerably. This point can be seen in any benchmark program that involves string manipulations.

It was a mistake to assume that a compiler can search out all of the syntax errors in the first (or even second) compilation. Not even the $10,000 FORTRAN compilers for the UNIVAC, DEC or IBM mainframes can do that.

In the case where he corrected an error, recompiled and still found that error, the problem is simple — he did not make the proper correction.

It can be understood that Mr. Kriz was frustrated when he could not get the programs he wrote to compile. But this is overcome after working with *MLBASIC* for a while. The fact that after all syntax errors are gone, the program should run correctly is not true. There are also such things as logic errors in the program itself. These are only discovered when the program itself is run.

The most important part of a review on a compiler should be the benchmark section where different programs are run in different language environments, and compared. The programs to be used should cover all of the features that are available in all of the compilers. This was definitely not the case in this review.

Only two correctly compiled programs, both containing floating point math, were used for the entire comparison. This was a bad comparison, since *MLBASIC* internally uses the same floating point ROM routines as the interpreter. The final outcome was obvious; both performed roughly the same.

The differences in *MLBASIC1* and *MLBASIC2* have been clarified in an update to the manual. The JOYSTK command can be used using VECTI, as described in the manual.

In summary, this review should have contained more information, and less opinion.

David Prey
Wasatchware

Mr. Kriz responds:

Yes, the review was biased — I was hoping and trying to get the compiler working so that the average user could load it up, compile a BASIC program and have a fast ML program to use. I even corresponded with Mr. Prey while writing the review in an attempt to work out some of the problems I encountered.

As for comparing *MLBASIC* to Microsoft's BASIC Compiler, I can compare *Elite*Calc* quite favorably to the more expensive *SuperCalc* that runs on IBM and other PCs. The same holds true for other CoCo software such as the *VIP Library* and *Telewriter-64* to name a few.

Mr. Prey says it was wrong for me to assume that Interpreter BASIC programs are directly compatible with *MLBASIC* syntax — allow me to quote from the brochure Mr. Prey sent me in the mail before I even received *MLBASIC* for review:

"*MLBASIC* is an enhanced BASIC Compiler designed to allow as much compatibility with exsiting Interpreter BASIC programs as would allow.

"*MLBASIC* is compiler (sic) that accepts a BASIC program as source in the same format as the Interpreter accepts.

"In most cases, the source program can be run using the Interpreter in order to debug the program for syntax or logic errors."

Regarding errors, with 20 years experience in computing including programming, systems analysis, consulting, and teaching at the college level, I am fully aware of the differences between syntax and logic errors. I am also aware that not every syntax error is caught in one try — the presence of some errors will sometimes mask others. However, with *MLBASIC*, the compiler repeatedly aborted or gave false errors, indicating errors on nonexistent line numbers. Incidentally, the syntax error-free programs that still would not run were the three I sent to Wasatchware. When Wasatchware returned them, two were running because Wasatchware made further changes to the syntax, not the logic. Yet the compiler had not indicated any errors. The third (graphics) program still did not run even after Wasatchware had a chance to work on it.

You mentioned comparing many different benchmarks — I would have loved to have compared many different benchmarks. I have about 35 games written in BASIC. I would have liked to have said that I compiled these games and they ran like the ML games we pay good money for — but they wouldn't compile.

As I mentioned above, I have 20 years experience in computing. I spent 35-40 hours working on this review without successfully compiling a single meaningful program. How can I honestly recommend this compiler, especially knowing that many CoCo owners are first-time users and lack the experience to deal with problem software?

James G. Kriz

CASTLE RAGOONA

Editor:

After reviewing Mr. Pelley's comments [April 1985, Page 190], I feel I may have made an ambiguous statement regarding the suitability of The *Castle Ragoona* program. I will clarify that item.

Castle Ragoona is not recommended for avid Adventure buffs.

Beginners to the realm of computer Adventure programs may enjoy the graphics. However, you will certainly get mixed feelings after you solve this Adventure, as there are no other solutions. Period.

As for the subject of clues, I have to admit that is a subject for interpretation. I interpreted it as lacking clues that generate the solution.

Mr. Pelley mentions random features; I did not find any in *Castle Ragoona* in the dozen or so times I played/tried the Adventure. As for the validity of my review, I stand in judgement for those who buy the program and compare it with my review. I believe my review to be objective and accurate. I can say no more.

Stephan A. Brown

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How To Use Your Radio Shack Printer Provides Thorough Information

William Barden, Jr. and those people at Radio Shack have come out with an invaluable book. *How To Use Your Radio Shack Printer* covers all current printers from Radio Shack including the CPGs, DMPs, DWs, DWPs, all eight LPs, the TP 10, QP I and II, and the Plotter/Printer. Not only does it cover all of the printers, but it also covers most aspects of using them.

The book is divided into three sections, each divided into several chapters. The first section is titled "Printer Basics." It includes six chapters dealing with "Basics of Printing." "How Your Printer Communicates with Your System" and several other "background" informational chapters.

The second section deals with "Printing Text" and has three chapters devoted to just that. Finally, the last section deals with "Graphics." The chapters included there are devoted to "Graphics Printing," "Screen Printing" and "Creative Graphics."

The book contains bunches of useful information, along with some interesting history. For example, do you know why there are some seemingly useless codes near the beginning of the ASCII alphabet? These are explained in the book as being on the "ancient" teletype machines and each has a line or two explaining its specific purpose.

How To Use Your Radio Shack Printer also contains invaluable information for those planning to buy a printer, since it tells of the different types of printers and explains each one's weaknesses and strengths. The book doesn't stop with just talk. It also contains several programs to demonstrate the point being made. These programs range from word processing utilities to screen dumps for the Color Computer/MC-10 and for the Model I/III/4.

If you have had your printer for a while and are looking for a way to put it to better use, or even to learn more about how it works, then this book is for you. I would also recommend it to those of you considering what kind of printer to buy, since there is such a thorough discussion of the differences between such printers as daisy wheel, dot matrix and others. This book is not limited to the type of computer you have, either, although it does specialize in those which are the most popular for its programs.

(Radio Shack stores nationwide, Cat. No. 26-1242, $14.95)

— Jim Sewell

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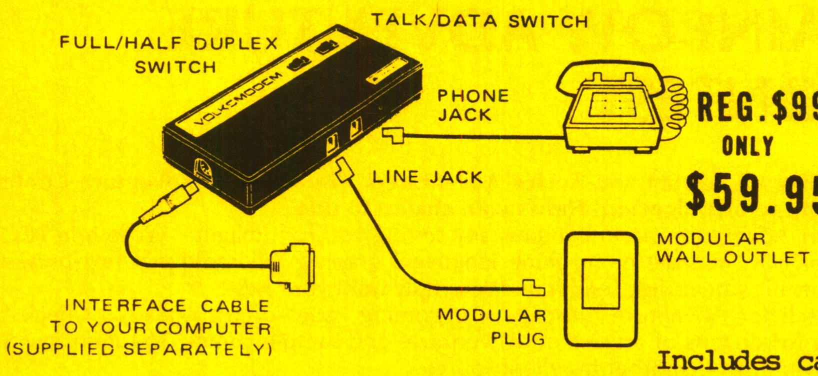

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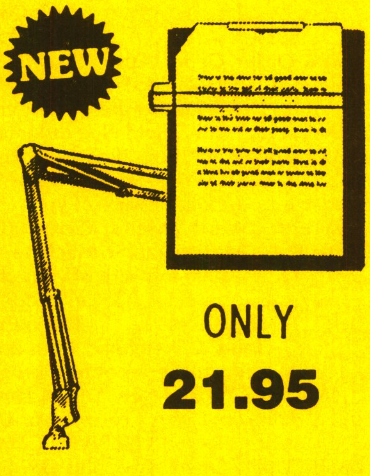

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Originality counts plenty, as does proper attention to documentation. Include a complete solution to the Adventure, along with features and aspects that deserve the judges' attention. In writing the Adventure, don't pack so tightly that we can't `LIST` or `LLIST` an entire line. If the program includes machine language, fully-commented source code must be provided, as well as a working, assembled version of your program. After all, we do want to share your gem with our readers. Indicate the minimum system needed to run your program, i.e., 32K ECB. Your program should run on standard Radio Shack equipment with no special modifications required and should not rely on commercial software for its execution. Put the accompanying article, the documentation, complete loading instructions and cover letter on paper. Include your name, address and telephone number on each page of all materials.

It is mandatory that several saves of your Adventure be submitted on good-quality tape or disk; if it won't load, it will not be judged. We will not type in even the shortest of entries. Be sure to write-protect your disk or punch out the tabs on your tape to avoid accidental erasure and label each with the name of the program and your name and address. As in any contest, packaging does make a difference.

Above all, get your entry in by July 1, 1985 in bug-free condition. Each entrant will receive a free pass to the RAINBOWfest of his or her choice. You could win any of the prizes donated by these generous businesses.

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Print True Lowercase Descenders with DMP-100 Line Printer Conversion

If you are the owner of a DMP-100 printer, then you are probably aware that it lacks capability to produce true lowercase descenders, unless they are created by software. Most of us have used a software program enabling the DMP-100 to produce true descenders, but let's face it, loading a printer driver just to give us the capability to create such a character is a hassle.

I have several of these programs, and I won't use them just for that reason. How many times have you started to print a business letter only to find out you forgot to load that pesky printer driver. If you were fortunate enough to have the capability to save the data and then load your printer driver, then you were OK. If not, then you had to start over. Several word processors will not accept a printer driver, and that is where the limiting comes into the picture.

The Electronic Closet has made available the DMP-100 Line Printer Conversion, a circuit that installs inside the Tandy DMP-100 Printer. The Electronic Closet makes available several types for upgrading the DMP-100, including a special purpose EC100 board for customers who would prefer to design their own special character set. The particular board I reviewed is the EC100A ASCII set.

The EC100A ASCII board installs easily inside the printer without any soldering or cutting on the printer board. The process takes approximately 30 to 45 minutes and should not be done before the printer's warranty has run out, as this procedure will void the existing warranty.

There are five screws holding the top half of the printer case; by removing the RS-232 board (a matter of two screws), you will have a clear view of the PCB (printer circuit board). After removing IC P3 (large 40-pin IC) from the PCB, you must place it on a small piece of plastic which is provided to protect the chip from static electricity.

Next insert the EC100 board ribbon cable in the empty IC P3 socket on the PCB; then insert the removed IC P3 chip into the socket provided on the back of the EC100 board. After you have completed the above process, you can store the board inside the printer, making sure it is not touching the PCB — that's it!

Though it appears very simple, I don't recommend it being done by someone who is inexperienced.

The problem that I encountered was the IC P3 chip on the PCB was not marked with the pin numbers, which could lead to confusion and might result in the chip being installed improperly, but the pin numbers on the EC100 board were clearly marked.

As for the installation instructions, I feel there should be more diagrams and it should be limited to the specific board that is being installed, instead of using the same documentation for several boards. This would greatly reduce the problem of confusion for a novice user.

The EC100 board does not affect the graphics capabilities of the printer, however, it does affect the underline feature and may not be suitable for some applications. The underline function can be fully restored by installing an extra memory chip. Installation of the extra memory chip does require soldering on the printer's circuit board.

If you would like to have true lowercase descenders like the more expensive printers without purchasing one, and would like to cure the problem of forgetting to load your existing printer driver, then you owe it to yourself and your DMP-100 to purchase the EC100 printer upgrade board. I recommend it highly.

(Electronic Closet, 8187 Blakely Ct. West, Bainbridge Island, WA 98110, $29)

— Bob Brown

One-Liner Contest Winner . . .

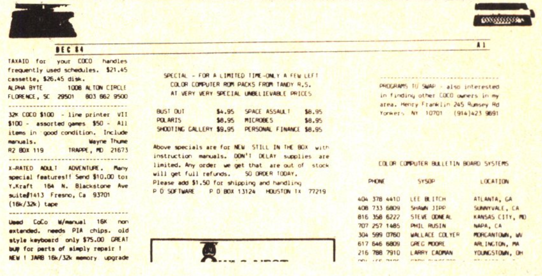
PMODE Madness is a very "graphic" display of what you can do by mixing modes.

The listing:

```
1 Q=RND(-TIMER):PCLEAR8:PMODERND
(4):SCREEN1,0:POKE65314,RND(215)
:POKE178,RND(255):A=RND(255):B=R
ND(191):C=RND(255):D=RND(191):LI
NE(A,B)-(C,D),PSET,BF:CIRCLE(128
,96),RND(94),,.75,.75:FORT=1TO500
:NEXTT:GOTO1
```

Dave K. Lucas
Watonga, OK

(For this entrant's second winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventures* and its companion *Rainbow Adventure Tape.*)



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Double Driver Is A Top-Notch Video Adapter

When the Color Computer first came out, I was disappointed that it didn't have video and audio output jacks. At the time, this was a reasonable step for a home computer like the CoCo since there were very few color monitors readily available and most CoCo buyers wanted color. Now, with many people using the CoCo for tasks that don't require color and many others wanting the improved picture quality of a monitor, video monitor adapters for the CoCo have become popular.

Moreton Bay's Double Driver is one of the better ones around; it installs as easily as any I've tried, and picture and sound quality are as good as you can expect from the CoCo. (I should note that the Double Driver is only for the original Color Computer and TDP System 100. It's quite a bit harder to adapt to the CoCo 2 for video output, but a few CoCo 2 drivers are on the market.)

The Double Driver is a five-transistor circuit on a board that mounts on top of the CoCo's RF modulator with foam tape. The video, power and ground connections are made by an adapter socket that fits between the MC1372 color encoder chip and its socket on the CoCo's circuit board. The sound signal is taken off by a clip attached to the audio input lead going into the modulator.

No soldering is required, and the whole thing can be removed neatly in case you need to take the CoCo in for repairs. This sort of modification does void the warranty on the CoCo, but the models that the Double Driver fits are long past the warranty period anyway. (The procedure is so simple you might think that you could do it without looking at the diagrams in the instruction sheet. Use them anyway. A friend of mine, installing a different adapter on his CoCo, put the socket under the nearby MC1723 chip by mistake.) No adjustments are needed to make the Double Driver work.

The Double Driver actually has three outputs: sound, color video and monochrome video. The monochrome output doesn't have the color subcarrier mixed in, so this signal will provide a clean picture on a monochrome monitor. The color signal is as good as any I've seen on the CoCo, with sharp edges and less color smearing. The audio output doesn't give a wider response than what you would get on a regular TV, but it is clean and free of the interference often heard when using a modulator.

My only real gripe about the Double Driver is that its cables are very short, only about a foot long. This is fine if your monitor has input jacks on the front panel (as quite a few do), but in most situations you'll probably have to buy another set of cables and use adapters to connect them to the cables coming out of the CoCo. The Moreton Bay people tell me the short cables work well for them; I'd still prefer longer ones.

If you have an older CoCo and you want to use it with a monitor (or even a video recorder), Moreton Bay's Double Driver is a good choice.

(Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, $24.95 plus $2 S/H)

— Ed Ellers

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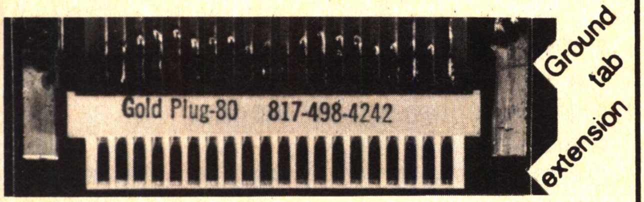

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See Yourself In Print With DS-69 Digisector

What is a DS-69 Digisector and who needs one? I asked myself this question several times while reviewing Micro Works' latest addition to hardware accessories for the CoCo. The DS-69 Digisector (normally called a digitizer) is a video digitizer which accepts composite black-and-white video from source such as a camera or a video tape recorder, and converts this signal to digital data suitable for storage in your CoCo. It's sort of a reverse VDG.

I can think of several applications where a Digisector would be indispensable. The first that comes to mind is slow-scan television, the type used by ham radio operators to send pictures around the world. If ham operators have so much fun communicating with slow-scan, why can't we use modems instead of the airwaves? Well, it's a reality with the Digisector.

First of all, we have to have the correct equipment. A 64K CoCo with tape is all that is required as far as computer equipment goes. In addition, you will need some type of input to the Digisector. The Digisector plugs directly into your ROM port.

For this review, a Sony AVC-3400 video camera was used. Enough of taking pictures from TV; I wanted a family portrait. Truly, due to the boom in VCR sales, a video camera is no longer an oddity in a typical household.

If you wish to use the Digisector with disk, a Multi-Pak Interface is necessary. The Digisector will not work with a Y-cable. The Digisector must be plugged into slot 1 of the Multi-Pak.

The software supplied with the Digisector is called *C-SEE*. This package makes the hardware function because a stand-alone Digisector would be of no use. *C-SEE* allows the amateur computer photographer to perform a myriad of tasks with the Digisector, the end results being taking pictures, storing them on tape or disk, and printing them on your printer. Only the disk software was supplied for review, but the only difference between the tape and disk versions is in the loading of the printer drivers. A summary of the commands follows:

T — Take a five-level scan
G — Take continuous five-level scans
S — Set up 16-level scan
K — Display 16-level scans
D — Disk menu
A — Cassette menu
P — Printer menu
Q — Return to BASIC

The CLEAR key acts as a toggle between the menu and graphics screens.

There are two modes of operation: manual and automatic. The adjustments are contrast, brightness, horizontal dither and vertical dither level. In the automatic mode, only the contrast and brightness are adjustable; the software sets the dithering levels.

In the manual mode, both dithering levels and brightness are adjustable. Adjustment is made by means of a scale at the bottom of the screen with either the keyboard or your joysticks.

If you notice by the menu, the Digisector (or we should more correctly say the *C-SEE* software) can take either five- or 16-level pictures. Its five-level routines place the digitized information in the graphics page of your CoCo for display as a 256 by 192 picture with five gray levels. The 16-level routines save a 128 by 96 picture with 16 gray levels for printer images.

In addition to the *C-SEE* software, another package is provided. *RANDAC* is a combination ML/BASIC program that allows individual pixel access to the 256 by 256 spatial resolution of the hardware. If you `POKE` the vertical horizontal coordinates into specified addresses, the brightness (zero to 63) level is returned for this pixel at another address. There is an example of how to use the `USR` function from BASIC for the same result.

Another program on the disk gave a good example of a practical use for the Digisector. Consecutive scans of the camera were compared in memory for any differences. If there was a change, a tone alerted you to the discrepancy — a video burglar alarm.

I had fun with the Digisector. Everyone in the household has had a picture dumped to the printer, not to mention all of the kids at my son's school. I noticed that good lighting was essential to maintain adequate brightness and contrast.

At first, taking pictures proved to be a little tricky, but it's just like getting a new camera. It takes awhile to get used to the settings. One fact I can attest to: I am not a photographer, but I still took some good shots.

The pictures were dumped with a Gemini-10X printer using the Epson software. We understand that early bugs in the printer software have necessitated a re-release of other drivers.

I have noticed that several other software packages are using the DS-69 for input. Among these are the *CoCo Max* and *View II* packages. The *View II* is a slow-scan TV package for hams. I have noticed at least two other digitizers on the market. I have not used either of these, but I have seen them in operation at RAINBOWfests.

The final decision should be yours as to whether you have to have one, but as far as sales went at RAINBOWfest-Irvine, I would say quite a few hackers want to see their beautiful portrait on the screen of a computer. Tim Jameson, the hardware and software designer, is to be congratulated.

(The Micro Works, P.O. Box 1110, Del Mar, CA 92014, $149.95)

— Dan Downard

Hint . . .

Freeing Up Some RAM

After you've finished debugging a BASIC program, if you find you need a little more RAM you can enter `RENUM 1,1,1`. In many cases, this will free up quite a bit of RAM because each digit of each line number in a program line takes up one byte; renumbering with low line numbers eliminates much of this waste.

Norman C. Lamb
Holloman AFB, NM

Powerful Information Management With *TIMS*, *TIMSMAIL* and *TIMSUTIL*

By Ken Boyle

To say I was surprised when I received Sugar Software's *Tape Information Management System* (*TIMS*) for review would be putting it mildly.

First, I had just upgraded to disk and second, *TIMS* had already been reviewed way back in the August 1982 issue of RAINBOW. Well, my apologies, RAINBOW, for ever having doubted your planning and organization. You see, as the old saying goes, *TIMS* isn't just for tape anymore! Not only is *TIMS* fully disk compatible, but also included in the package from Sugar Software was *TIMSMAIL*, a customized mailing list version of *TIMS* and *TIMSUTIL*, an enhancement program that adds several new options to *TIMS* and *TIMSMAIL*.

Before providing a synopsis of each program, I would like to cover the common points. Each program arrives on cassette with a very well-written user guide containing about 16 pages worth of detailed information on how to get the most out of the program. The programs are written in Extended BASIC with machine language subroutines and require 32K, although both *TIMS* and *TIMSMAIL* will run with an extremely small database in 16K.

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As a test, I set up a small mailing list with names, addresses and phone numbers. On my 32K (disk) machine, I was able to hold 200 addresses (records), while on a 16K (disk) machine I could hold only 10. Cassette-based machines should be able to hold slightly more.

All the cassettes contain two versions of the program. First, preceded by Sugar Software's *Auto-Run* program, is a compressed version to more fully utilize available memory. Second is the original, fully commented version, for those of you who like to modify programs to your own taste. Although the programs are shipped on cassette, complete directions are given for copying them to disk. Needless to say, this means the programs are not copy-protected, which is as it should be for a user-modifiable utility program. Now, let's get into the synopsis of each program.

TIMS is a general database program that lets you set up and maintain information in record format with up to eight variable length fields per record. The program is completely menu-driven and is about as user friendly as I can imagine. The initial menu contains the following options.

The Create Mode allows you to define the format of your database, including number of fields and the name of each field.

The Input Mode then allows you to enter data into your database field by field. The input screen layout is very well-done and also provides you with the number of records entered and records remaining.

The Sort Mode lets you sort your information on from one to three fields. The sort itself is written in machine language and is very fast. An out-of-order set of about 120 records took about 15 seconds to sort on one field. The sort time of course varies with the volume, number of fields and field size, but I found most of my sorting to be under one minute.

The Range Search Mode allows you to search through the database by field looking for any data that falls between the two values you provide. For instance, if one of your fields is "last name," you might request all names starting with 'A' through 'F.' This option is also written in machine language and is again quite fast. As each record is found, the information is displayed on the screen and you may continue to the next record, modify or delete the displayed record or return to the main menu.

Before continuing, I must mention the Modify capability. *TIMS* lets you modify via use of a "phrase substitution editor." What this means is that to change something you must first type what currently exists and then what you want to change it to. While I didn't find this the easiest or best approach, it still works quite satisfactorily.

The next option, Item Search Mode, works like the Range Search except you request a specific item. In other words, if you ask for the name "Falk" you will get *all* records containing those four letters. Thus, while you would surely get "L.C. Falk," you might also get "J.C. Falkenberg."

The sixth option, Print Mode, is very involved. First, you can write your report to the printer, tape or disk giving you the ability to read the report into a word processing program for further customization. The general report format is completely covered, including all margins, lines per page, characters per line, starting page number, report date and title. Fields from each record can then be printed in any order, with or without the field name. The entire database can be printed, or only selected records. You really have a great deal of control on what to print and how to print it.

The Tape I/O option allows you to load, save, append or verify (`SKIPF`) a file. The append allows you to combine, within memory constraints, multiple databases or files.

The Disk I/O option is basically the same as tape with the addition of a `DIR`ectory option and the ability to change the default drive number.

Within the memory constraints of this review, that about covers *TIMS*, although I'll have a few general comments later on.

TIMSMAIL — Mailing List Manager (Version 1.0)

The second program I received, *TIMSMAIL*, is really a customized version of *TIMS*. The eight possible fields per record are predefined as follows: 1) First name, 2) Last name, 3) Address 1, 4) Address 2, 5) City/State, 6) ZIP code, 7) Telephone and 8) Acct.#/ID#.

All the options that are present in *TIMS* are also available in *TIMSMAIL*, with the exception of the Print option which has changed drastically. Since this is a mailing list program, printed output is oriented toward printing labels rather than a report. It seems to me, although I can't guarantee it, that every possible type of standard self-adhesive label has been covered; from single sheets to continuous stock, from one to three across and from 2½ to 4 inches wide.

In addition, the output from *TIMSMAIL* is directly compatible with *TIMS*, should you own a copy and wish to print your mailing list in report format.

TIMSUTIL — *TIMS* and *TIMSMAIL* Utility (Version 1.0)

The final program is *TIMSUTIL*, an enhancement program for use with both *TIMS* and *TIMSMAIL*. This program will read your database created with *TIMS* or *TIMSMAIL* and provide you with several additional options. The initial menu is as follows:

The Search Mode allows range searching and item searching as in *TIMS* and *TIMSMAIL*. However, it also provides you with a multi-term search mode using `AND` and `OR` conditionals. For instance you could seach for last name "Falk" `AND` initials "L.C." to guarantee that "J.C. Falkenberg" didn't show up on your report.

Speaking of reports, *TIMSUTIL* does not have a print option. What you must do instead is use option 5, which is Split File, to create a new file of only selected records. You would then read this file into *TIMS* or *TIMSMAIL* for printing.

The second option, Global Change, works like the modify command using the "phrase substitution editor," except it works on the whole database instead of a single record. It also allows you to search on one field and modify another. For instance, to save space, you might search your database for all references to RAINBOW and change "Volume Number" to "Vol."

The next option, Global Delete, allows you to search your entire database and delete any records that match your search criteria. This is a quick method of purging old or outdated information.

The Record Change option is extremely powerful in that

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it provides you with the means of changing the format of your database. You can create an entirely new field and add that field to any or all of your records. In addition, you can also remove a field from all your records.

I briefly mentioned the Split File Mode earlier. This option allows you to create a subset of your database by creating a new file with only those records meeting your specific selection criteria. This is especially useful if your current database is getting too large. This option can easily split it into two or more pieces for further expansion.

The last options, Sort Mode, Tape I/O and Disk I/O, are exactly like their counterparts in *TIMS* and *TIMSMAIL*. This completes the synopsis of each program. What follows are some general comments and observations on these programs.

I found the programs both easy to use and quite thorough in their capabilities. For those of you with cassette systems, they will allow you to set up and maintain a very nice database. And later, when you upgrade to disk, *TIMS* will make the transition with a minimum of effort.

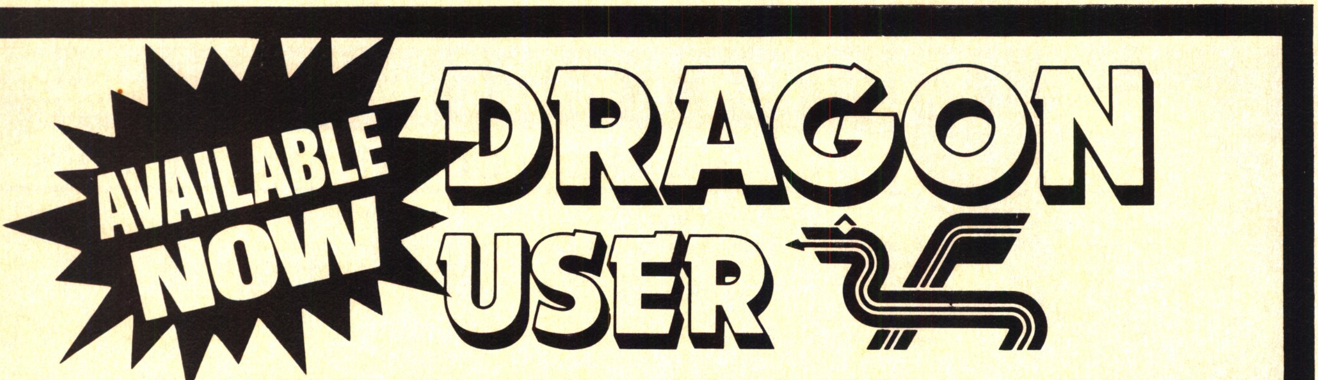
For those of you already using disk, the decision is a little more complex. Although *TIMS* is totally disk compatible, it is still cassette oriented in its design. What I am trying to say is that other, more expensive, disk-based information management programs use the disk as an extension of memory and therefore allow your database to be much larger than *TIMS'*. If volume is not a major consideration (remember, you can use the Split File Mode), then you could not go wrong in seriously considering these programs.

As I mentioned earlier, *TIMS* is very user friendly. To really test this out, I asked my 12-year-old daughter, Marissa, if she would help her mother and me by setting up and maintaining a mailing list/phone directory of our friends and relatives using *TIMSMAIL*. Being one who likes to "play office," she was very enthusiastic about the project. I sat down with her and in about 30 minutes she was using the program like an old pro. In fact, I found she was experimenting with the different options and really getting into the project far beyond what I had originally intended. From a computer-shy young girl who was really put off with programming, I now get more questions about the computer and disks, etc., than you can possibly imagine.

One final note before I end this rather lengthy review. Sugar Software provides, in the user guide, detailed information on their file layout so programmers can use this information to write *TIMS* compatible programs. Outside of one mistake (the X1 number of fields variable should actually be number of fields minus one), I was able to write a short and sweet disk program that reads my disk directories and creates a *TIMS* compatible file.

Now I can keep track of all my programs and even add a comment field for future reference. And to think I was going to go out and pay more for a similar and less powerful disk management program. Sugar, you made my day!

(Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, 32K cassette, *TIMS* $24.95, *TIMSMAIL* $19.95, *TIMSUTIL* $14.95)



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Ease Proofreading Problems With *VIP Speller*

Here is something everyone can really use. Word processors have freed us from the drudgery of writing, editing and correcting errors. There is still the chore of proofreading, however, that can fill the bravest with dread. Checking for spelling errors has always been the bane of my existence. Even those few words that I am sure how to spell can be overlooked again and again. To the rescue comes the computerized *VIP Speller* for 32K disk from VIP Technologies, formerly Softlaw.

Please understand, a spelling checker won't find mistakes in grammar or illogical sentences, but it will locate any words that are not in its dictionary. Let's list those qualities we would like and then see how the *VIP Speller* stacks up.

1) It must be fast. *VIP Speller* was three times faster than another spelling checker I tried, going through a 24K file in about 10 minutes.

2) It should do the checking by itself, without constant attention from the user. Some checkers require the user to sit at the terminal and decide what to do with unknown words as they are found. *VIP Speller* locates all unknown words without attention from the user. You may then deal with them as you like; you have several options. You can view the list of words on the screen or have them printed out on a printer. You can correct the spelling of each word in your text or save the list of wrong words on disk and deal with it later. If you like, the *VIP Speller* will mark the location of each wrong word in your file with a '#.' If the words are spelled correctly but just aren't in the dictionary, you may add them to your dictionary.

3) It must be simple to use. *VIP Speller* is very friendly and leads you through, step by step. In fact, it is so easy you could throw the manual away. *VIP Speller* also makes it easy to correct spelling. The *VIP Speller* will present the unknown words one at a time, as they appear in your text. You may view the word in context, with a couple of sentences displayed before and after, to help you decide what to do. If the word is correct, you can have the checker ignore it for the rest of the text and you have the option of adding it to your dictionary. If you misspelled it on purpose, you can have the checker ignore it just this one time. For incorrect words, you can enter a new spelling. *VIP Speller* doesn't change your original text, all corrections are written to a new text file. The original text is kept as a backup file and the corrected file becomes your working file.

4) It should have a large, comprehensive dictionary. *VIP Speller* has a very large dictionary of 50,000 words and it takes up nearly an entire disk (almost 140K!). No matter how large the dictionary, however, some words are bound to be left out. Because of this, *VIP Speller* not only allows you to add words to the main dictionary, it also allows you to create additional dictionaries which may be used in succession. For example, you could have a special dictionary for esoteric medical terms, or a dictionary for a foreign language.

5) It must be easy to use for those with only a single disk drive. Some checkers require that the checker program, dictionary and text file all be placed on the same disk in order to be used on a single drive system. *VIP Speller* allows you to have the checker, dictionary and text file all on separate disks. You load the checker, then the text file, then simply leave the dictionary in the drive as the checking is done. Single drive owners are limited only by the size of the supplemental dictionaries they can create (half a disk instead of a whole disk).

6) It must work with a variety of word processors. *VIP Speller* will check any text file that has been saved in the ASCII format. I tried checking files from three different word processors with excellent results. The *VIP Speller* can also be used as part of the *VIP Integrated Library*. This includes *VIP Writer, VIP Speller, VIP Database, VIP Terminal, VIP Calc* and *VIP Disk-Zap*.

A couple of more points. You can look through the dictionary as much as you like (it doesn't have definitions, only spellings), except when you are in the middle of correcting a file. Unlike the other VIP programs which have Hi-Res screens with true lowercase, *VIP Speller* uses the normal text screen.

You can buy any of the VIP programs direct from VIP Technologies or by express order at your local Radio Shack store. If you buy the *VIP Writer*, you get the *VIP Speller* at no additional cost.

All in all, I'm impressed with the ease of use and friendly features found in the *VIP Speller*, and I recommend it to anyone who, like me, hates to proofread.

(VIP Technologies, 132 Aero Camino, Goleta, CA 93117, disk $49.95)

— James Ventling

Canadians
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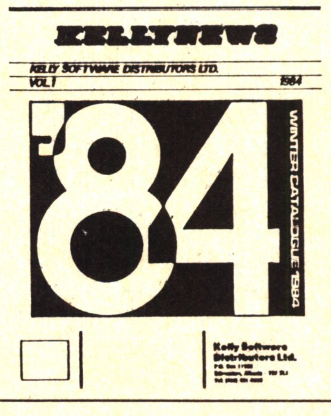
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Multifeatured *Word Processor* Is Easy To Use

Word Processor is a multifeatured program that has a lot of functions for a small price. It is supplied on tape and requires 16K and Extended BASIC. At a price of $5, which includes shipping and handling, you can't go wrong if you want to get started in word processing on a small budget. This program is not in the same class as the big boys such as *Telewriter-64*. But, dollar for dollar, it packs just as much, if not more punch.

I'll describe some of the features this program has that are quite useful. Although the program uses the standard 32-character display, you can display the whole file to the screen as it will be sent to the printer (except underlining). It does this by leaving a blank line on the screen at the end of each printer line. You are asked on start up how many characters per line you want sent to the printer. With the feature, you just type in your text and let the computer do the formatting. There is a help file that will describe the commands available to you by pressing a single key.

Another excellent feature is that your text is not lost if you hit the BREAK key, get an error, etc., while using the program. There is also a Verify command that will verify that the file saved to tape is a good one. By pressing a single key, you can see how much space you have left (5,000 characters maximum), and you can also set a Baud rate other than 600.

Finally, one of the features that is quite helpful is the ability to embed printer control codes anywhere in the text. This allows you to intermix different character pitches, underline, have emphasized type, etc., in the same line.

I think a novice would find *Word Processor* relatively easy to use. (I did have some problems, but it was because I have used *Telewriter-64* for over a year and a half now and kept trying to issue commands from that program.) To start word processing, you just hit 'N' for "New File" and start typing. As long as you don't need to do anything fancy like set up columns, etc., you'll have no problems. Editing seemed somewhat cumbersome, but much simpler than my first word processing program which required the user to type in the string of characters that needed editing.

In *Word Processor*'s edit mode you can insert, change, and delete characters, or perform a search for the (x)th occurrence of a character. The thing that is somewhat cumbersome in this mode is that to get to a particular section of the text you have typed in, you have to scroll the curser through each and every character. You could let the computer get you there automatically by searching for a particular character, but if you have to count all the occurrences of a particular character, you can probably scroll through the text just as fast.

The program is relatively slow in formatting the text to be sent to the screen in the display mode or to the printer. But for the person that only occasionally uses a word processor, I don't think it would be a serious problem.

There were some things I found irritating about this program. One, all files sent to tape are saved under the filename *MLFILE*, instead of letting you use a filename of your choice and thereby letting you save several files on a single tape. Also, when saving, loading or checking a file, the cassette starts up as soon as you give the command to do one of these three things. The problem here is that the computer doesn't really do any I/O until you hit the ENTER key. So this could cause some problems. All other software I have ever worked with that has a cassette I/O does not start the cassette until you hit the ENTER key.

One other thing, you are limited to a 5,000 character maximum for your document. I'm sure the program would be more attractive to users if this number would automatically increase in larger machines.

Word Processor has two pages of documentation and that's all you really need. I would highly recommend this program to the user that wants to get started in word processing on a bare bones budget.

(Drayon Software, P.O. Box 2516, Renton, WA 98056, $5)

— Michael Hunt

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Hint . . .

Stop Those Drives

If you've started up a program on a disk-based system and for some reason the disk drives are still running, entering `POKE 65344, 0` will stop them.

Norman C. Lamb
Holloman AFB, NM

Measure for Measure
Conversions Helps Out

Have you ever wondered how many square yards there are in two hectares? No? Frankly, neither have I. But, many people have to make conversions from one measurement unit to another. I do it all the time.

As a physics teacher, I often have to make a quick conversion from miles to meters or gallons to liters. The conversion process can be either simple or difficult. It depends on how familiar I am with the units. If I remember the conversion factor, the process is simple. If not, it's more trouble.

Finding an odd conversion factor is usually frustrating and time-consuming. If you do any unit converting at all you probably should have help from your CoCo. *Conversions* is one way of getting that help.

Conversions comes on tape or disk. It will run in 16K and requires Extended BASIC. There is no problem saving the cassette copy to disk; the program is not copy-protected. The program is written in BASIC and, with the exception of a couple of bugs, does what it was designed to do. The four pages of instructions and information are clearly written and easy to understand.

After you `CLOAD` and `RUN` *Conversions*, you are presented with a title screen and then a menu. The menu contains eight categories of conversions as well as a choice for Help. They are length, area, volume, liquid capacity, weight and temperature. The liquid capacity category is larger than the others and is split into three sub-categories.

Conversions allows for conversion within a measurement system or between systems. You can, for example, convert from U.S. fluid ounces to U.S. pints or to milliliters or imperial gallons. Each category includes seven or eight units to choose from except temperature (which includes two).

Once you have chosen a category from the menu, you are presented with a column of units for that category. To do a conversion, you use the up- and down-arrow keys to position a cursor next to the unit you would like to convert from. Next, you enter the number you want converted. Finally, you use the arrow keys to move the cursor next to the unit you want to convert to and press the slash (/) key. The equivalent value is displayed and the conversion is complete. You can then move the cursor to another unit if you want and get additional equivalent values.

If you want to enter another number, you must clear the screen first by pressing CLEAR. You may not simply enter a new number over an existing one. The Help screen says that the 'C' key clears the screen, but the program only responds to CLEAR. There is a "zoom" feature which eases the job of making repeated conversions between two units. When you press 'Z' after clearing the screen and entering a new value, the cursor jumps to the last unit you converted to and displays the conversion. The program allows the results to be sent to a printer if you have one.

There are some problems inherent in any program which converts between measurement systems, and *Conversions* is no exception. For each conversion there are several "accepted" conversion factors. Cozy Software was careful to provide an explanation of these problems with the instructions.

Another problem is one that physics teachers are particularly sensitive to. That is the confusion between weight and mass. The pound is usually considered a weight (or force) unit while the gram and kilogram are mass units. It is incorrect to consider these fundamentally different quantities to be the same. Unfortunately, the two quantities are used incorrectly much of the time and the programmer has made as good a compromise as is possible.

The program has several irritating bugs which should be fixed. They are not catastrophic. The worst that can happen when a bug strikes is the program crashes and has to be rerun. Still they should be easy to fix and seem to indicate insufficient error testing by the programmer.

User mistakes lead to unexpected results when they should produce no results. If you press the slash key before moving the cursor after a number is entered, the program crashes with a division by zero error. If an arrow key is pressed at the main menu, you are presented with a blank conversion screen. Sometimes numbers can be accidentally entered over existing numbers leaving part of the original number intact. None of these things should be able to occur. Better error-trapping would help greatly.

Another minor annoyance is that the programmer has given no clean method to exit the program. You have to resort to the BREAK key to exit.

Should you buy *Conversions*? If you have a need to convert measurements you should consider it. If you are a moderately capable BASIC programmer, you should be able to write a similar program without a great deal of trouble. The price is certainly reasonable, so if you would rather do something else with your programming time it won't cost much to add *Conversions* to your program library.

(Cozy Software, 25142-53 Ave., Aldergrove, British Columbia, Canada V0X 1A0, tape $12, disk $14)

— Donald L. McGarry

One-Liner Contest Winner . . .

This one-liner translates any desired Hex value into decimal and binary.

The listing:

```
0 CLS:PRINT@260,"65535-256  ^  2
55-1":PRINT@128,"DEC.1-65535=";:
INPUTN:PRINT"HEX=&H"HEX$(N):PRIN
T"BINARY=":C=N+1:FORP=15TO0STEP-
1:IFC>=(2^P)THENPRINTCHR$(8)1;:C
=C-(2^P):NEXT:FORD=1TO4000:NEXT:
GOTO0ELSEPRINTCHR$(8)0;:NEXT:FOR
D=1TO4000:NEXT:GOTO0
```

K.E. Kenny
The Hague, the Netherlands

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Stave Off Catastrophe By Returning The *Stone of ROKAN*

Up till now, the Jamura tribe has been blessed with peace and an abundance of food, which has been the result of ROKAN, their deity. The village people have always pleased ROKAN by worshipping his image, the "Stone of ROKAN." But the stone has just been stolen by a band of thieves! As the Chieftain (great warrior), can you find and return the stone before ROKAN is angered enough to bring famine and pestilence to your tribe?

Stone of ROKAN is a 32K Extended BASIC text Adventure. It's supplied on cassette and cannot be run with a disk system, since the program requires all 32K of RAM. If you have a disk controller, you must unplug it and load the program in from cassette, which takes about two minutes. A single instruction sheet is included, explaining loading procedures, the idea behind the Adventure (as explained in the first paragraph) and principle of play.

This is the most difficult Adventure I have played that is written in BASIC. Several hours have been spent plugging at the keyboard, and I still haven't solved it! The map I have drawn shows over 60 locations, with objects to be found throughout the Adventure. This is a text Adventure, with a high resolution map of the country to travel. The instructions say that LOOKing at a certain object will cause the screen to switch to the Hi-Res map. However, after looking at every object I found, and trying countless other things, I couldn't figure out how to display the map during game play!

In order to see it, I wrote a short routine to display the graphics screen. After all this trouble, the map didn't seem to show me anything of importance anyway. Objects are not displayed on the map, but the countryside, Great Lake and the Great River are shown.

Despite these problems, the Adventure is very well written and will keep any Adventurer busy for hours (or days!). Before starting, you are given the choice of putting the objects to find in random places or in the standard location. It's best to keep them in the same place unless you solve the Adventure and want a change of pace. Commands are typed in by entering one- or two-word phrases, such as `GET KNIFE` or `KILL BOAR`.

To move around, just enter the first character of the direction to travel. A command summary is provided in the game itself, but it's missing one command that the documentation lists: CLIMB.

It is very easy to be quickly killed if you look at or do the wrong things. And, of course, you must start over if killed. Remember to make a note of things that kill you to be better prepared the next time!

Stone of ROKAN is a difficult Adventure, but is suitable for anyone, from little Kathy to Grandpa Jones. Listing through the program may give you an idea of what to expect, but don't plan on getting too many hints by cheating that way! If you need help, Pal Creations asks you to write to them. I have enjoyed the Adventure, and recommend it to anyone who likes a good challenge.

(Pal Creations, 10456 Amantha Ave., San Diego, CA 92126, tape $19.95)

— Darren Nye

One-Liner Contest Winner . . .

This educational one-liner asks you to solve 10 multiplication problems. When you have finished, it tells you how many seconds they took to solve.

The listing:

```
0 CLS:PRINT"TIMED MULTIPLICATION
 QUIZ":INPUT"ENTER TO BEGIN";A$:
TIMER=0:FORZ=1TO10:A=RND(12):B=R
ND(12):PRINTA"*"B;:INPUTC:IFC<>A
*B THENPRINT"WRONG CORRECT ANSWE
R IS";A*B:Z=Z-1:NEXT:ELSEPRINT"C
ORRECT":NEXT:PRINT"IT TOOK YOU"T
IMER/60"SEC. FOR 10 QUES."
```

Robert Davis
Dallas, OR

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

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Children Learn 'Shapes' and 'Stars' With *QUIZ KIDS*

QUIZ KIDS is actually two separate educational programs written for use with Radio Shack LOGO. *LOGO SHAPES* and *LOGO STARS* are available separately or as a package, but each one must be loaded and run individually.

The goal of *LOGO SHAPES* is to learn the shape and name of six graphics: circle, diamond, heart, square, star and triangle. The goal of *LOGO STARS* is to learn the outline and name of five star constellations: Big Dipper, Cassiopeia, Cepheus, Draco and Little Dipper.

They've thoughtfully provided two copies of each program, but you can also make backup copies. They run equally well with tape or disk LOGO. I have disk LOGO and was able to load from tape, and run and save to disk.

The documentation consists of three printed pages that take you step by step from the initial insertion of your LOGO ROM pack, through each part of the two programs and includes suggestions on how you might change the timer and/or score counter to encourage or challenge each child. The documentation doesn't give instructions for disk operations, but that doesn't take much imagination.

Each program has three parts: Study — where you're first shown each shape or star constellation with its name; Practice — where the stars or shapes are flashed on the screen with an adjustable time delay before the name of the shape or constellation appears; and Test — flashes a shape or constellation and you must type in the name.

You begin by starting LOGO and loading one of the "programs" by pressing 'L,' 'T' and ENTER. Wait for the prompt to return, then type `R STUDY` and ENTER. You can move to another part by pressing BREAK, then 'R' plus the name of the part you want (Study, Practice or Test) and press ENTER.

B&B Software was very nice in responding to inquiries and the programs have been improved by adding a prompt at the bottom of each screen telling the learner to "Press ENTER for next screen." That makes things more user friendly.

The Test mode requires keyboard input that is completely unforgiving. Answers must be typed correctly the first time. You can't edit a typo. A quote from the documentation: "... the word WRONG appears as soon as the first incorrect letter is typed." That's a real drag, but something you can't get around in LOGO. A passing score is rewarded by a special graphics screen.

My kids, aged 7 through 16, weren't interested in *SHAPES*. They feel they already know what's a circle, square or triangle. But this tape might be useful if you'd like to see how those shapes are made. Just press BREAK, 'E' and you're in LOGO's Edit mode. Move around by using the arrow keys to see all of the procedures. Pressing BREAK 'P' will send the contents of the editor to your printer.

LOGO STARS is much more interesting. I'd never learned the names of any constellations. Now I've learned five. *STARS* shows the position of each star along with an outline of the constellation. Now I can look up at the night sky and recognize some of the same imaginary figures watched by ancient shepherds and astronomers.

Remember, I told you I saved the programs over to the kids' LOGO procedures disk. But reviewers aren't allowed to keep copies of software. LOGO has no Kill command, so I had to figure out how to kill those two modules without losing everything the kids had saved. Here's how you can kill a LOGO disk module: BREAK, clear memory with SHIFT/CLEAR, then press 'S,' 'X' (where 'X' is the letter of the module you want to erase) and ENTER.

(B&B Software, P.O. Box 210, Jenkintown, PA 19046, *SHAPES* $14.95, *STARS* $14.95, both $22.50. Radio Shack Color LOGO is necessary.)

— Bob Dooman

Reye syndrome is a ***rare but dangerous*** condition that can develop from ***flu or chicken pox.*** It occurs mainly in ***children under 16,*** usually when they ***appear to be recovering.*** Watch for these signs:

- ***Persistent vomiting***
- ***Fatigue***
- ***Confusion and belligerence.***

If your child displays any of these symptoms, ***consult a doctor immediately.***

Some studies indicate that there may be an association between the use of ***aspirin*** for flu and chicken pox and the development of Reye syndrome. Further studies are being conducted on this possibility. In the meantime, the ***U.S. Surgeon General*** suggests that you check with your doctor before using aspirin or any medication when your child has flu or chicken pox.

—A message from the Food and Drug Administration.

REYE SYNDROME

See You At

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Software Review

CoCo Counts Calories With *DIET-ADE*

DIET-ADE, by Dennis O. Dorrity, is designed to help those of us whose weight has slipped beyond the recommended level and to assist in regaining our trim, more healthful selves. This is done by conscientious calorie counting, encouraging a supervised exercise program and providing the feedback necessary to maintain such a program.

The 16-page manual is clearly written and explains the operation of each of the three segments of the program. The first is "Calorie Counter" which consists of 60 screen pages with eight food types or portions on each page. Using arrow keys, the food choice is selected and added to the meal or the day's calorie count by hitting the ENTER key.

A Shopping List option allows a food to be listed on a printer so you may go armed with written guidelines when shopping, and perhaps avoid the dreaded impulse urge that can add so much to a bill (or a waistline).

A clever use of the SHIFT and arrow keys allows the dieter to flip through the pages to the desired food items, adding them to the total of calories for the meal. Allowance is made for correction of mis-keying or the addition of an unlisted food item. This will prove necessary on occasion, as even with some 480 listings the attempt to shoehorn a complete selection of food choices is certain to face the limits of CoCo's 32K.

When the user has selected the foods for a given meal, a note must be made of the calorie total, as both the individual meal totals (to be kept on a logsheet) and the day's total calorie total must be kept to make full use of the program. Provision was not made to store this information in the program.

"Calorie Quoter" is the second part of *DIET-ADE* and it provides the dieter with a calorie limit based on hours slept, gender and ideal weight. The latter may be gained from tables scaled to height and relative frame size (small, medium, large). The user enters a weight from these tables or another figure determined by personal feelings or a doctor's recommendations. A maximum calorie intake is then determined and shown to the user. Again, written notes must be taken.

The third routine in *DIET-ADE* is "Calorie Minder." The Calorie Minder allows some fine tuning of the day's caloric intake by letting the dieter see how many calories are left for a snack after the regular meals are consumed; if some overindulgence has taken place, it lets the truant dieter choose from a list of 10 common exercises and asks how many minutes of exercise were done today. Zero minutes of exercise is accepted.

Depending on the net result of calories consumed as food and then burned as a result of exercise, the dieter is then advised that he must perform his chosen exercise for so many minutes to burn off the excess calories, or if the total allows, the lucky dieter is told that he may still eat 'X' calories for the day.

The manual is indexed and there is a keyboard summary. A list of abbreviations (conveniently located with the summary on the outside back cover for ease of reference) includes a master logsheet that assists the dieter in keeping meal-by-meal and day-to-day records of progress as well as a tally of exercise levels achieved. This written record can provide the encouragement to continue a regular dietary and exercise regime.

DIET-ADE should be of value to anyone interested in such a program and, as with any similar aid, is best used in conjunction with the advice of your health care professional.

(HARMONYCS, 1747 Patricia Lane, Salt Lake City, UT 84116, cassette or disk $19 plus $2 S/H)

— Nevin Templin

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One-Liner Contest Winner . . .

This one-liner creates randomly colored "bubbles" on a PMODE 3 screen. After drawing 150 bubbles the program starts over. It's a rather simple program that perks up a cluttered computer area.

The listing:

```
0 PMODE3,1:PCLS:SCREEN1,0:FORZ=1
TO150:W=RND(15):T=RND(4):X=RND(2
55):Y=RND(191):C=RND(8):COLORC,C
:FORD=1TOW STEPT:CIRCLE(X,Y),D:N
EXTD:NEXTZ:GOTO 0
```

Christopher Novosad
Columbus, TX

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Addition & Subtraction of Fractions & Mixed Numbers 2.1 — The Name Says It All!

This was an interesting program to review. *Addition & Subtraction of Fractions & Mixed Numbers 2.1* deserves praise because it offers almost unlimited practice with the kind of fraction problems that give students the most difficulty: namely, addition and subtraction of fractions and mixed numbers. The program also monitors the student's responses continuously and offers help when needed.

The strong points of the program include nine levels of difficulty which are arranged in a logical order of skills. The student may begin at any level, and is promoted or demoted automatically at the end of each set of problems, depending on the number of correct responses. Another strong point (one that I was particularly pleased to see) is that the student must do each problem step-by-step, with no shortcuts.

This program is not a problem generator that puts a problem on the screen and then tells the student only if the answer is right or wrong, but rather a program that monitors a student's response at every step in a problem. Solving most math problems involves a pattern of steps, and this program rigidly enforces the correct pattern. Any errors are caught at the stage of the pattern where they occur instead of being signaled only at the end of the problem. An immediate reminder of the correct step is given (again and again, if necessary), and the student must type in the correct answer before proceeding with the next step in the pattern.

Scores are kept on the screen continuously so the teacher and student can monitor progress. This also makes it easy to record a score for a student who has to leave a lesson early. Answers can be entered in both right-to-left and left-to-right formats.

Computational errors can be corrected by pressing 'U' to undo the last digit typed. Most programs use the left arrow for this function, so the program notes the use of 'U' at the bottom of the screen.

There are two minor weaknesses in this program, however. First, some of the comments made after a student has made a number of errors in a problem are too similar to the messages given for correct responses. I feel that a student using a tutorial program needs to know how they are doing in clear terms. Telling a student who has made six errors in one problem that his effort is "not too bad" (as this program does randomly) breeds false optimism. Messages such as "hang in there" or "keep trying" are more appropriate, and this program does present these at random after incorrect responses. I wish the program segregated its reward and consolation messages more effectively.

Second, there is no documentation provided. True, the program is more or less self-explanatory, but at least a brief explanation of how the program functions (and perhaps examples of the problems generated on each level of difficulty) would aid a potential user who might not have the time to run through all nine levels.

All in all, *Addition & Subtraction of Fractions & Mixed Numbers* is a good program, suitable for both tutorial and drill, and practice work in class and home.

(Timothy Mc Ilwee, R.R. 2, Box 462A, Dundee, IL 60118, cassette $10)

— Mark Williams

One-Liner Contest Winner . . .

This one-liner helps you set up your TV set or monitor for use with the CoCo.

The listing:

```
1 CLS:FORX=0TO63:FORY=0TO31:C=IN
T(X/8+1):SET(X,Y,C):NEXTY,X:INPU
TQ:CLS:FORX=0TO63:Y=15:RESET(X,Y
):NEXTX:FORY=0TO31:X=31:RESET(X,
Y):NEXTY:INPUTQ:GOTO1
```

James Dale Duncan
Hendersonville, NC

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

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Software Review

Soup's On For Preschoolers With *Alphabet Stew*

Most of us have heard the old saying "soup's on." Well, at Triad Pictures Corporation, the soup is *Alphabet Stew*. It's taken a while for educational software to develop for the CoCo, but it is now beginning to take shape. *Alphabet Stew* is one of the simple forms of this educational software.

Alphabet Stew is written for a target group of children ranging from 3 to 7 years old. It just so happens that I have one at each end of this range. My oldest went through most of the words and pictures in no time. My youngest simply likes to press buttons and watch pictures.

Alphabet Stew comes on cassette tape and is written for a 32K CoCo. Pressing any letter, number or punctuation key will produce a response. The punctuation keys produce interesting combinations of sound. The number keys each produce progressive tones up the scale. These may be used by an imaginative child to play simple songs. The five-page manual contains eight songs covering three pages of the manual.

Now we get to, pardon the expression, the meat and potatoes of *Alphabet Stew*. Each time a letter key is pressed, a word beginning with that letter appears in the upper left-hand corner of the screen and a graphics screen containing a pictorial representation of that word appears. Some of the pictures include sound and animation, and others are just still pictures. Each letter produces two pictures, alternating between them.

Several letters may produce the same picture associated with a different word, such as "jog" and "run." Other words like "yellow" simply produce a solid yellow screen.

The graphics are well-done and I found no bugs with the software. Younger children need adult supervision, as the manual suggests. The older children will learn the words quickly and may soon become disinterested as mine did.

If you have preschool children, *Alphabet Stew* will be worth your while. It will also assist them in learning the keyboard.

(Triad Pictures Corp., P.O. Box 1299, Sequim, WA 98382, 32K tape $18 plus $2 S/H)

— Larry A. Birkenfeld

One-Liner Contest Winner . . .

Palindrome Squares finds squares of integers which are palindromes — those which read the same in reverse as they do normally.

The listing:

```
1 N=N+1:S$=STR$(N*N):T$=RIGHT$(S
$,LEN(S$)-1):FORX=1TOINT(LEN(T$)
/2):IFRIGHT$(LEFT$(T$,X),1)<>LEF
T$(RIGHT$(T$,X),1)THEN1ELSENEXT:
PRINTN"SQUARED ="N*N:GOTO1
```

Stanley Townsend
Alturas, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventures* and its companion *Rainbow Adventure Tape*.)

Software Review

Juggle's Rainbow Helps Children Learn Directional Concepts

Juggle's Rainbow games were developed for children 3 to 6 years of age. The purpose of the games is to allow your child to enjoy the opportunity to learn and explore the concepts of left/right and above/below.

Juggle's Rainbow does require some assistance for most of the beginning levels, at least the ability to read the one- or two-word instructions on the screen. Later in the game, markers will be available to aid in the continuation of the game.

"Juggles" uses the following games to help teach the ideas he is trying to portray: *Juggle's Rainbow, Juggle's Butterfly* and *Juggle's Windmill.*

The documentation is nice looking, but does lack some in the quality of pictures used to show the placement of two plastic strips that come with the game. You can guess where the strips go and still get the idea of the games, but don't rely on being able to see them in the pictures. The rest of the documentation is simple, easy to follow and to the point.

The games are quite good at using graphics and changing the screen to keep the interest of young ones. If your 3-year-old needs this kind of help, you might be interested in this one. If it's for your 6-year-old, she/he may get bored rapidly (mine did).

The only other drawback to the package is that it may be overpriced for the average person.

(The Learning Co., 545 Middlefield Road, Suite 170, Menlo Park, CA 94025; requires 16K ECB $29.95)

— Anthony R. Compton

One-Liner Contest Winner . . .

This one-liner shows a motorcycle jumping off a ramp. Evel Kneivel rides again.

The listing:

```
0 Y=182:DIMA(5):PMODE4:SCREEN1:P
CLS:CIRCLE(4,186),2:CIRCLE(12,18
6),2:DRAW"BM4,186M+3,-3R2U1NL2NU
1D2M+3,+3BM126,192M+20,-6D6":GET
(0,179)-(16,189),A,G:FORX=0TO99:
PUT(X,182)-(X+16,192),A,PSET:NEX
T:FORX=99TO250:PUT(X,Y)-(X+16,Y+
10),A,PSET:Y=Y-.25:NEXT:RUN
```

Joel Snipes
Dunn, NC

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

MLBASIC Helps CoCo Translate Into Machine Language

By James G. Kriz

"Wow! This is it! What all of us programmers who happen to prefer BASIC to the bits and bytes of machine language and assembler have been waiting for — a full BASIC compiler!"

These were my thoughts as I read the announcement from Wasatchware about *MLBASIC*, their new BASIC compiler. Phrases like "*MLBASIC* is . . . designed to allow as much compatibility with existing Interpreter BASIC programs as would allow" and "features all of the commands that are available with Standard, Extended and Disk BASIC" jumped off the page. Under the heading "Program Development," it explains that the user can "develop programs using existing software designed for development of Interpreter BASIC programs."

With all this, it seemed the CoCo finally had a complete BASIC compiler that would be comparable to the Microsoft BASIC compiler for the IBM PC. Unfortunately, after living with this compiler for a little over a month, it is my sad duty to report that we must still wait for the ultimate compiler.

For you neophytes out there, let me briefly explain that a compiler takes a program written in an English-like language, such as BASIC, and translates it into a machine language program that the computer requires to run — the same language the fast-running arcade games we enjoy are written in.

In contrast, the interpreter that represents CoCo's built-in BASIC reads the BASIC statements as you have written them and "interprets" them every time it encounters them in the program — this is why BASIC runs so much slower than machine language. The ideal for many programmers is to write programs in an easy language like BASIC, then get it translated into machine language to enjoy the speed and other advantages.

Now to the review. My first attempt to use the compiler was to take some programs I had written in BASIC and compile them as I have done successfully several times on the IBM PC using the Microsoft compiler. Using *MLBASIC*, I was unable to compile any program I had previously written for the CoCo interpreter, so if you think you can buy this compiler and compile all your existing programs, forget it.

Although it supports most of the same instructions that CoCo BASIC uses, many have differences in their formats. In addition, variables are handled somewhat differently. Numeric variables may be classified as integer or real, and real variables must be declared as such. All string variables must be dimensioned, meaning that if you wish to compile an existing program, you must first go through the program and find all your string variables and put them in DIM statements. You must also make sure you have an END

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statement as the last statement in your program (a recommended practice, but sometimes overlooked) or the compiler will run right out the bottom.

I made those changes, but my programs still wouldn't compile due to format differences and different restrictions on the use of variables in certain instructions. I should also point out here that I teach data processing and programming at the college level, and when my students get to the point where they think they have a correctly written program, I tell them to compile it and let the compiler find their errors. I tried that with *MLBASIC* and found that, in some cases, the compiler just "hung up" or aborted without indicating all errors. In other cases, I found that changing an instruction at the point of an indicated error still resulted in the same error upon recompiling.

At this point I gave up trying to compile existing programs, and tried writing some relatively simple programs following the documentation supplied with *MLBASIC*. I wrote two programs and adapted one graphics program that I had downloaded from a bulletin board.

All three programs finally compiled with no errors, but none of the three would run. (The frustration level was rising!) I sent the three programs to Wasatchware to see if they could get them running. When the programs came back, the two programs I wrote ran, but the graphics program still would not run and I still do not know why.

Compiled programs should run significantly faster than their interpreted counterparts. The two programs that ultimately compiled were a program that finds all the factors of a given number and the prime factors of that number, and a program that calculates primes simply by repetitive division. I timed each of these programs and the results are shown here: *FACTORS* (factoring the number 9678) compiled — 31.48 seconds; *BASIC* — 37.09 seconds; *BASIC* with `65495 POKE` — 26.21 seconds; *PRIMES* compiled — 1:26.41; *BASIC* — 2:52.9; and *BASIC* with `65495 POKE` — 2:03.65.

A review is not complete without a general description of the package — this one is well-documented and includes a 152-page manual. Each instruction is explained on its own page and differences between the interpreted BASIC format and *MLBASIC* format are given.

The manual is generally well-written, although there are some points that could use some clarification. For example, there are two versions of *MLBASIC* — *MLBASIC1* and *MLBASIC2*. *MLBASIC1* does in-memory compiling of smaller programs, while *MLBASIC2* uses the disk and will compile programs of almost unlimited size. The manual gives instructions for loading and executing *MLBASIC1*, and says that to use *MLBASIC2* just substitute the word `MLBASIC2` for `MLBASIC1` in the instructions. This is not true. *MLBASIC2* skips the loading of the program to be compiled, and loads and runs somewhat differently from *MLBASIC1*.

The compiler supports most of the same instructions that Interpreter BASIC supports, but a few are missing, including `JOYSTK` and the graphic `GET` and `PUT`, probably the three most important instructions for programming games. It should be pointed out that the compiler does have some of its own instructions for interfacing to machine language subroutines, so it may be possible for the more experienced among us to link into the ROMs for those subroutines.

Although I must compliment Wasatchware for their efforts in writing a compiler, the results fall far short of what we really need for the CoCo. The price ($69.95) would be fair for a working compiler but, in this case, I recommend you save your money or go for the extra bucks and get BASIC09.

(Wasatchware, 7350 Nutree Dr., Salt Lake City, UT 84121, $69.95 plus $4 S/H)

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One-Liner Contest Winner . . .

Just enter any word (especially names) and watch your word fall apart and rebuild itself.

The listing:

```
0 CLS:LINEINPUT"A WORD? ";N$:CLS
:L=LEN(N$):Z=47-(L/2):FORB=1TO9:
PRINT@Z+1,N$:FORX=1TOL:FORY=Z+X
TOZ+416STEP32:PRINT@Y,MID$(N$,X,
1);:PRINT@Y-32," ";:NEXTY:POKE14
0,1:EXEC43345:NEXTX:FORQ=Y-(L-1)
TO32STEP-32:PRINT@Q,N$:PRINT@Q+3
2,STRING$(L,32):NEXTQ,B:RUN
```

Jack Henderson
Astoria, NY

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Keep Lists In Manageable Form With *File Two*

You have a short list of names you want to keep track of, but your address book is full. What do you do? One way to remedy the problem is to get *File Two* by West Bay Company. It will keep short lists of almost anything in a manageable form, on tape or disk.

File Two comes on cassette only, with a loader program and the database on one side and sample data on the other. Tape users would `CLOAD` the loader program and run it, and it automatically starts up. Disk users, after saving both programs to disk, simply `RUN"F2Loader"`. The loader program clears graphics pages because they are not used, determines the type of system you have (tape or disk) and subsequently loads the program.

The first thing *File Two* does is ask if you want instructions. These are a brief summary of the four pages of instructions. It then asks if you wish to load a data file. If you answer yes, the program proceeds to prompt for the information needed to load data. If you answer no, however, you have to type in the fields before you can proceed to the main menu.

The main menu gives you nine options: File Maintenance; Search File; Sort File; Save File; Print File; View File; Totals: Fields 3 and 4; Help and Info; and Process New File. The main menu also shows file capacity in records, total records in file, and memory remaining. On my 64K disk system, I had less than 500 bytes remaining upon starting the program, with only 10 records being able to fit in this memory.

File Maintenance gives you three options: add a record, delete a record or edit a record. Adding records appends the new ones to the end of the file. Deleting records asks for the record number, shows the record and asks if it is the correct one before deleting it. Editing records prompts you for the number and then lets you type in the whole record again.

The data size is extremely limited. Only 10 fields with up to 20 characters each can be entered per record. This is hard to adjust to for people used to working with larger databases that are disk-based instead of memory-based.

When searching a file, you can search through the entire record or just a specific field. The program will then display the first record that matches and prompt you if you want to display more or not. "Yes" displays the next record that matches, while "no" returns you to the main menu.

Sorting the list is done by a certain field that was previously input and is in machine language so it sorts the list alphanumerically very quickly.

Save File is just as the name implies. You are asked for tape or disk and then the filename just as when you load a file.

Print File allows you to print out the file in a variety of ways. You can print any four fields, any six fields or straight through the list. This gives you the option of printing labels.

View File puts one record on the screen at a time, with one field per line with the field names preceding the data. You can then go forward in the file, backward or quit to the main menu.

Totals: Fields 3 and 4 gives you the only calculating ability in the program. *File Two* keeps a running total of fields three and four separately and gives you the totals when you press '7' (if the fields are not numeric, the totals are zero).

Help and Info gives you another chance to look at the brief instructions contained within the program. It is useful if you forget something and want to look it up fast.

Process New File reruns the program asking if you want instructions and if you want to load a new file. If you choose not to load a new file, you must then retype the field names you wish to use.

File Two at first seemed to kill the disk I had in the drive. When I typed in `DIR`, all I got was garbage. Resetting the system revealed that it was something the program was doing to memory, not the disk, if you list the program after it has started running. Intentional or not, this program is not copy-protected.

If you need to keep a large database with small space limitations and power of handling files, then *File Two* is not for you. Its total in-memory use prevents it from being used as a serious database. I would, however, recommend *File Two* to a person who has never used a database before so he/she could learn about it, or to a person with small needs. But for $20, this program can't be beat.

(West Bay Company, Route 1, Box 666, White Stone, VA 22578, 32K ECB, cassette $20)

— Andrew Dater

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Word-Pak II: The Original *Word-Pak* All Grown Up

By Dale Puckett

Most people have at one time or another learned to hate the 32 by 16 display on their Color Computer. A number of software answers to the problem have been introduced, but they eat up 7K of RAM.

If you have a monochrome monitor, you can now have a true 80-column display on your Color Computer. Several companies are marketing 80-column boards for your CoCo that plug in like ROM packs; all of these products give your Color Computer an 80-column display just like the expensive computers. And they all work well. But, until now, each has had at least one limitation. What really makes the difference is the way the 80-column board works with your existing equipment and the features you expect from your addition.

PBJ was one of the first companies to present a non-software answer to the 32 by 16 nightmare. Their *Word-Pak* gave you a true 80-column display with crisp letters, but you had to give up any graphics capability when using *Word-Pak*, and you needed a switcher to switch cables back and forth between Radio Shack's screen and the *Word-Pak* screen. PBJ's *Word-Pak II* answers most of your complaints with the original *Word-Pak*.

Word-Pak II is the original PBJ *Word-Pak*, grown up. Learning from experience, PBJ added the very few things they left out of the original. In fact, the additions have been installed so carefully that the original *Word-Pak* instructions are still appropriate. This allows you to use any software written for *Word-Pak* with *Word-Pak II*!

To get the full use out of *Word-Pak II*, you will need a Color Computer, either a Y-cable or a multipack interface (I use PBJ's CC-Bus), an 80-column monitor and a monitor adapter (such as Video Plus) inside your CoCo . If you're hardware oriented, you can build the video driver presented on Page 188 of the May 1984 issue of THE RAINBOW.

You'll also need a monitor adapter to pick up the Radio Shack graphics screen. *Word-Pak II* lets you switch between its 80-column character display and the Color Computer's graphics screen using software. With *Word-Pak II* there are no external switches to throw, no cords to unplug — a simple poke at location &HFF9C switches you between Radio Shack's graphics output (`POKE` a 0) and *Word-Pak II*'s output (`POKE` a 64).

A recent change to the original *Word-Pak*, which is not available with *Word-Pak II*, is the inclusion of a BASIC driver on EPROM that lets you see *Word-Pak*'s display when you power up. But, you won't find this PROM in *Word-Pak II*. Why? Because you don't need it.

Word-Pak II comes alive with the normal video display. In fact, you'll see the Color Computer's 32 by 16 display until you run the BASIC driver for *Word-Pak II*, then your view will switch to the *Word-Pak* 80-column display. This feature saves you a lot of time and frustration.

With *Word-Pak II* you can use your normal CoCo display as long as you want. This gives you complete compatibility with the graphics programs your friends may write without as much as a single modification. And more importantly, you won't need to flip a switch to change the display, let alone connect and disconnect cables.

The original *Word-Pak* is still being sold for about $120. *Word-Pak II* costs about $150. Both let you send control codes with BASIC's `CHR$` statement or the CLEAR key. PBJ's BASIC driver programs the CLEAR key so that it becomes the Control key. This means you can clear the screen by holding down the CLEAR key and pressing the letter 'L,' or you can simply type, `"PRINT CHR$(12)"`.

With the addition of the Control key, both versions of *Word-Pak* give you 15 new control codes. They include the following commands:

Sound bell tone,
Backspace cursor on character position
Advance cursor one character position
Move cursor down one line (scroll if at bottom)
Initiate x-y cursor positioning (similar to `PRINT@`)
Clear screen
Move cursor to start of next line
Home cursor
Turn destructive cursor on
Turn destructive cursor off
Erase from cursor to end of line
Erase from cursor to end of screen
Turn inverse character mode on
Turn inverse character mode off
Change number of characters per line display

Both *Word-Pak*s let you use x-y cursor positioning, 80 by 64 by 32 column screen widths (the number of characters per line is changed, but the width of the characters is the

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same 80-column character).

Here's a neat feature. The `PRINT@` statement has been modified. It automatically calculates the correct printing position based on the current screen width. Now you can develop software once and view its output on a number of different screens with a single, simple command.

PBJ has also redefined the down-arrow key. It is now used to enable a screen editing feature of *Word-Pak*. This screen editing is a handy feature that is very useful, and well-documented. Basically, it lets you enter programs in much the same manner as you use a word processor.

Word-Pak comes with all the documentation you will ever need and a BASIC program that lets you create your own character sets. For the cost of an EPROM and a nominal fee for burning the EPROM, PBJ will even burn your character set in a PROM.

But, if you don't want to bother with the design of custom characters, don't worry. *Word-Pak II* comes with your choice of three standard sets: the original set seen in their ads, a new character set with a larger character matrix or a standard Radio Shack Model IV character set. The choice of character sets is provided at no additional charge if specified at time of purchase.

Word-Pak or *Word-Pak II* — The Differences

If you're still trying to decide which one to buy and haven't seen anything yet to help you make your decision, here are the differences.

Word-Pak II has two new control codes. They are enable/disable smooth scrolling and change scroll rate.

These two features let you specify the rate that the text speeds by. Smooth scrolling means the characters are moved up one raster line at a time instead of one character line at a time; it is a pleasure to the eyes. It is also a feature that has been ignored on other 80 by 24 cartridges for the Color Computer.

As mentioned earlier, *Word-Pak II* allows you to select between the 80-column screen and any graphics page. You'll most likely find a number of software houses exercising this ability soon.

The only restriction I can find to *Word-Pak II* is that your monitor *must* have at least a 16-meg bandwidth. However, there aren't many monitors being sold that use a lower bandwidth. Besides, *Word-Pak II* will still work with a cheaper monitor. You'll just have to look at fuzzy characters.

While *Word-Pak II* is a great enhancement to Color BASIC, it's a necessity in the world of OS-9. OS-9 is a more serious environment from an operator's point of view. Here, a 64-column screen is the minimum, and an 80-column screen is the ideal.

Stylograph III and *DynaStar* are both *Word-Pak* compatible, so you will find either version of *Word-Pak* a welcomed addition when you're writing. And, here's another plus: Under OS-9, *Word-Pak II* actually frees up two pages of memory.

PBJ also offers upgrades from *Word-Pak* to *Word-Pak II*. The cost of upgrade is less than $100. You must return both the old hardware and any software drives to buy the upgrade.

The bottom line? If you're serious about your CoCo and want to get the most out of it — *Word-Pak II* is a must!

(PBJ, Inc., P.O. Box 813, N. Bergen, NJ 07047, $149.95)

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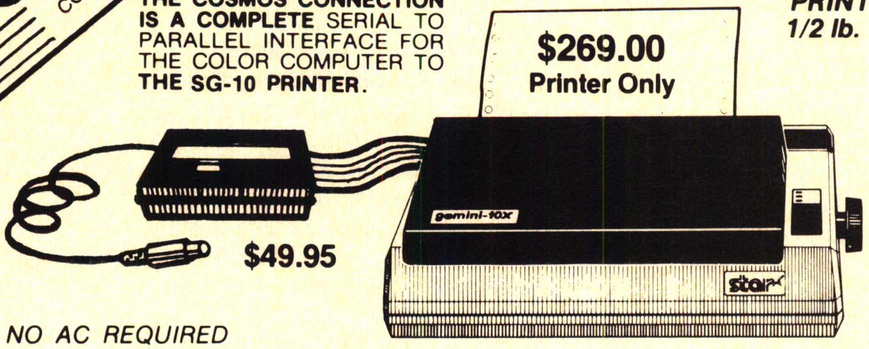

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JDG Kalends Is A Fast, Simple CoCo Calendar

By Don Dollberg

The new year was only a few days old when the mailman showed up with another program for review. Quite an appropriate time to try out a computerized calendar. The calendar program in question is *JDG Kalends* by Jade Products.

My non-computer friends still can't understand why one would use a computer to balance a checkbook. When they saw the calendar program, I can assure you that it really made their day! Every year my secretary gives me a new desk calendar which I use for a few weeks and soon give up. I must be the only one in the office with the calendar still set to January when it's the Fourth of July! So, am I a good candidate to review a calendar program? Well, since I'm fortunate to have a CoCo sitting on my desk at the office, I decided to try out the computerized version.

The *JDG Kalends* program, which comes on disk with an eight-page manual, requires a 32K Disk BASIC CoCo and is written entirely in machine language. *JDG Kalends* is actually a very specialized database manager. It is designed to allow the user to schedule appointments each day in a manner similar to using the standard desk calendar. The program comes on an unprotected disk.

BASIC COMPILER

MLBASIC 1.0 - BASIC COMPILER

WASATCHWARE is pleased to introduce what we feel is the most comprehensive BASIC Compiler available for the Color Computer. This BASIC compiler, called MLBASIC, is for programmers who want to create machine language from BASIC programs. Written in machine language, MLBASIC will prove to be the most powerful utility on your shelf.

COMMANDS SUPPORTED

1. I/O -Commands
CLOSE CLOADM CSAVEM DIR DRIVE DSKI$
DSKO$ FIELD FILES GET INPUT KILL
LSET OPEN PRINT PUT RSET

2. Program Control Commands
CALL END EXEC FOR STEP NEXT
GOSUB GOTO IF THEN ELSE ERROR
ON..GO RETURN STOP SUBROUTINE

3. Math Functions
ABS ASC ATN COS CNV EOF
EXP FIX INSTR INT LEN LOG
LOC LOF PEEK POINT PPOINT RND
SGN SIN SQR TAN TIMER VAL

4. String Functions
CHR$ INKEY$ LEFT$ MID$ MKN$ RIGHT$
STR$ STRING$

5. Graphic/Sound Commands
COLOR CLS CIRCLE DRAW LINE PAINT
PCLEAR PCLS PLAY PMODE PRESET PSET
RESET SCREEN SET SOUND

6. Other/Special Commands
DATA DIM LLIST MOTOR POKE READ
REM RESTORE RUN TAB VERIFY DLD
DST IBSHFT LREG PCOPY PMODD PTV
REAL SREG SWP VECTD VECTI

WASATCHWARE believes that the 6809 based microcomputer is powerful enough to warrant such a compiler. MLBASIC is a BASIC compiler that allows structured programs (using SUBROUTINEs), full floating point arithmetic and other features not available with Interpreter Basic programs.

Tape- $69.95
Disk- $69.95
Both- $74.95

64K Required

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The first thing the documentation informs you to do is make a backup on a blank diskette. Now I know anyone using a disk system would do this, but the system is designed such that the calendar program and the calendar data, i.e., appointments, reside on the same disk, a feature which the single disk drive user will appreciate. So, you wouldn't want to run the risk of bombing the original with all that writing going on throughout the year. After backing up the master, simply type `RUN "KALENDS"`.

JDG Kalends greets you with a main menu with the following four choices: 1) Return to BASIC; 2) Erase calendar data; 3) Change printer defaults; and 4) Access calendar. Option 1 simply does a cold start to BASIC. Option 2 is used at the beginning of each year to set up the calendar for the new year. When you choose option 2, *JDG Kalends* will request the last two digits of the year. You have a range of 84 to 99 to choose from. After selecting the year, the disk will then churn a bit as *JDG Kalends* formats a file on the disk.

Option 3 allows several selections for printing: *JDG Kalends* will prompt for the Baud rate (150-2400) and whether the printer requires a line feed after a carriage return. You also have the option to compress the printout by eliminating the times of the day for which you have made no appointments, or you can print the entire day with spaces to write in later. Finally, option 4 allows you to access the actual calendar program.

Upon accessing the calendar mode, *JDG Kalends* will load from disk the month displayed at the last time *JDG Kalends* was run, e.g., if the last displayed day was Jan. 14, then the next time *JDG Kalends* is run this day will be displayed. One of the nice things about *JDG Kalends* is that the entire month is resident in memory, so it's very easy, and rapid, to scroll through the month using the arrow keys. *JDG Kalends* provides a series of easy-to-learn, one-letter commands which allow you to easily move throughout the year, month or day. Before describing these commands, let's take a look at screen display and the information contained therein.

The *JDG Kalends* screen display is the standard text screen. I would have personally preferred the use of a Hi-Res screen with true lowercase letters, but this would have taken up much more memory and would not have allowed an entire month to be loaded into memory (so Jade Products informs me). The top line of the screen contains the date displayed as the Julian day, i.e., a number between 1 and 365. The month and day are also displayed. The next 12 lines are used for the appointments and the last three lines are used for displaying system messages, etc.

For a given day, you can select either morning (7:00 to 12:30), afternoon (11:00 to 4:30) or evening (4:00 to 9:30) or a free format, i.e., you assign the times or no times at all — more about this later. Upon selecting a day, *JDG Kalends* has a built-in screen editor which allows you to enter your appointments.

The command structure is very simple. For example: It's January 1 but you just learned that a family reunion is planned for the Fourth of July. When you initialize *JDG Kalends* the first time, the screen will display the first of January. To easily get to July 4, simply press 'M' followed by a '7' (for July). The disk will churn a bit and the screen will display July 1. At this point, the entire month of July has been loaded so you can either scroll to the '4' with the arrow keys or simply press 'D' followed by a '4.'

JDG Kalends will now display the appointments for July 4. As we said earlier, the display has room for 12 appointments. To set the time of day press 'T' and select morning, afternoon or evening. Then select 'E' for the editor and with the arrow keys enter the event opposite 4 p.m., or is that 1600? Yes, *JDG Kalends* uses 24 hour or military time. This is necessary so a proper sort of appointments can be made. However, if you don't like this, use the editor to change the time, but the appointments will not sort correctly.

Now that we have scheduled the event, let's leave ourselves a reminder of the event sometime in June, say June 15. Move to this date as described above only now select the free format which will present a blank page for June 15. Using the editor, enter the reminder. If later you need to schedule appointments on this day, simply use the editor to enter the time along with the appointment.

In my operation of *JDG Kalends* I have used the free format exclusively. It is very easy to enter exact times as well as enter reminders. If you use the formatted option, you can still change the times and even blank the times so that messages may be entered.

While this may seem like a complex procedure, it is actually very simple and fast. The process of getting to a particular day is only a few keystrokes, none of which involve the ENTER key. The editor is a nice screen editor similar to those found in most word processors. The arrow keys are used to move about the screen while in the editor and to insert or delete.

Since *JDG Kalends* loads an entire month's appointments, it is very fast to move about the month. Moving from month to month is also fast — just a couple of disk churns. But, you may ask, what about the search capability? Well, I checked this out by entering Christmas on December 25, 1985 and then went back to Jan 1. Using the 'F' (Find) command, I entered "Christmas" as the search term. *JDG Kalends* proceeded to search beginning with the current day and searching forward through the year. It took only 45 seconds to move to December 25. Anyone who complains about that can go flip pages on a desk calendar!

The printer option is limited to printing either a particular day or the calendar for a given month. The monthly calendar printout is rather limited in that there is no place to write. Its usefulness is very limited. I would like to have had a full page print of the monthly calendar with spaces to write messages. The other printer option, i.e., printing a given day, is of course useful for when you are not near the computer. I think a useful option not currently present in *JDG Kalends* would be the ability to print an entire week.

As I have said before, I've been using *JDG Kalends* for a couple of weeks at work. I use it for both appointments and reminders. In that time, *JDG Kalends* has performed flawlessly. For those of you who are convinced you need a computerized calendar, I strongly recommend *JDG Kalends.*

(Jade Products, 519 N. Scott, Wheaton, IL, 60187, requires 32K ECB, disk $28)

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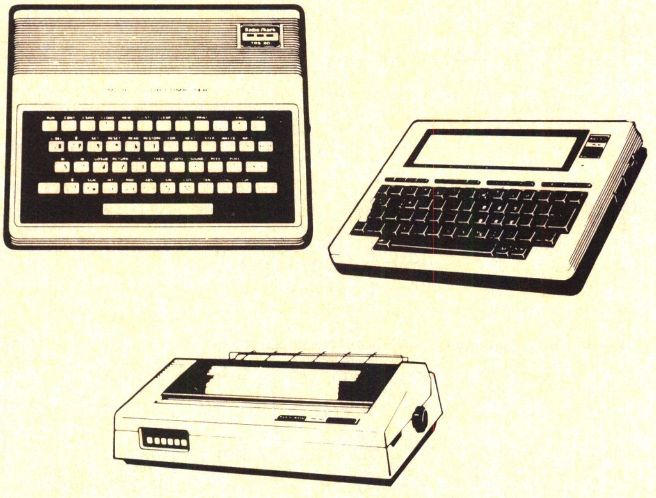

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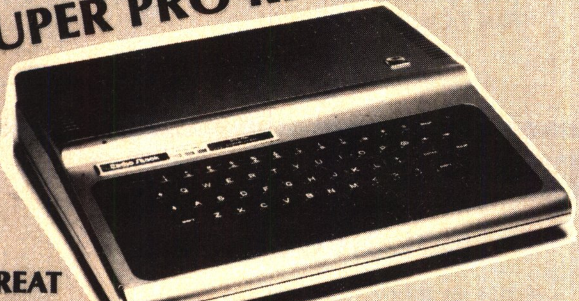

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* Computers produced after approximately October 1982 require an additional keyboard plug adapter. Please add $3.95.

SUPER BUG

Mark Data Products' **SUPER BUG** is a powerful, relocatable machine code monitor program for your CoCo. If you are a beginner, the program and documentation are an indispensable training aid. If you are an accomplished computerist, **SUPER BUG**'s capabilities, versatility and convenience will prove invaluable during programming and debugging. Many outstanding features, including hex and alpha numeric memory display, modify, search and test; full printer support with baud rate and line feed select; up to 220 breakpoints; mini object code disassembler; 64K mode setup; decimal, hex and ascii code conversion routines and extensive documentation. **Cassette $29.95** **Disc $32.95**

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Data Management System

Rainbow, Nov. '84 *"Easy File is one program that lives up to its name . . . Easy File is so easy it speaks for itself."*

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Need a good mailing list or customer list program? How about a program to keep track of your investments, your computer magazines, or record collection? Do you have an inventory of all household items for insurance purposes? **EASY-FILE** will do all of these things and many more. The **EASY-FILE** master disc and instructions are packaged in an attractive 3-ring binder. Requires 32K and at least one disc drive.

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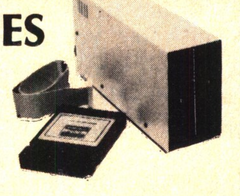

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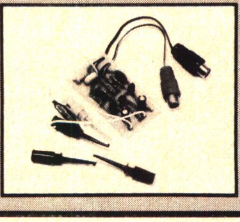

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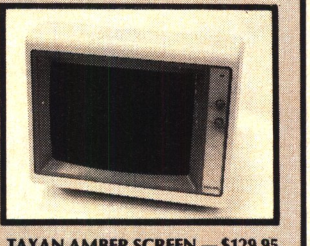

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Hot CoCo, June '84 *"...a serious, professional accounting program and well worth its price. The programs are complete and simple to use."*

The Mark Data Products Accounting System is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P & L or income report, an interim or trial balance and a balance sheet.

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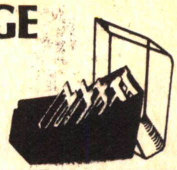

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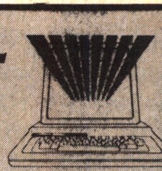

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Hot CoCo, Jan. '84 *"Super Screen represents a quality utility program that fills a definite need for the serious CoCo user. No other programs on the market so far have offered the error-trapping utility of Super Screen."*
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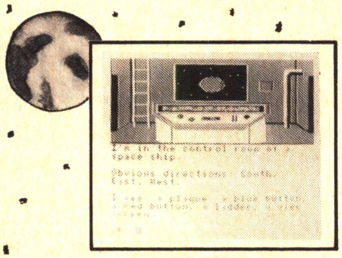
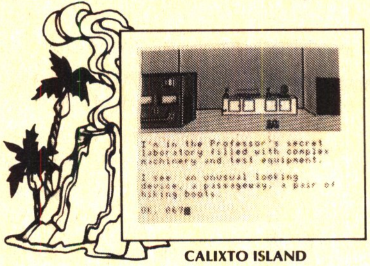


```
I'm in the control room of a
space ship.

Obvious directions: South,
East, West.

I see: a plaque, a blue button,
a red button, a ladder, a view
screen.
```

TREKBOER

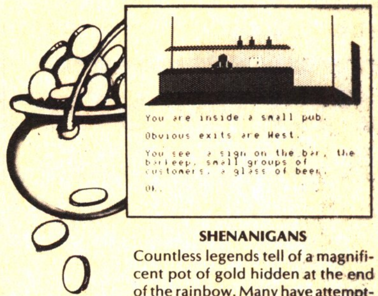
This exciting hi-res **adventure** begins aboard the starship Trekboer in the 21st century. Life on Earth is threatened by a deadly virus and your mission is to search the frontiers of space and return with a cure to save mankind from disaster.



```
I'm in the Professor's secret
laboratory filled with complex
machinery and test equipment.

I see: an unusual looking
device, a passageway, a pair of
hiking boots.

OK, 867█
```

CALIXTO ISLAND

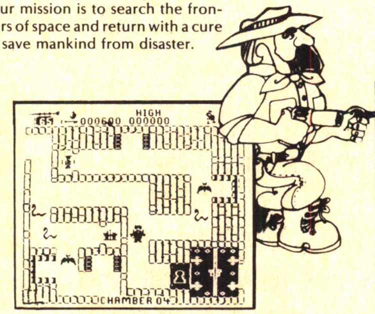
A valuable museum treasure has been stolen; can you recover it??? This is a challenging **adventure** with an occasional twist of humor. You'll visit a secret laboratory, a Mayan pyramid, and you'll meet crazy Trader Jack—all in living color and exciting detail.



```
You are inside a small pub.

Obvious exits are West.

You see: a sign on the bar, the
barkeep, small groups of
customers, a glass of beer.

OK.
```

SHENANIGANS

Countless legends tell of a magnificent pot of gold hidden at the end of the rainbow. Many have attempted to find the marvelous treasure but success has eluded them and it remains hidden to this day. You, as a dedicated **adventurer**, have determined to search for the fabled riches.



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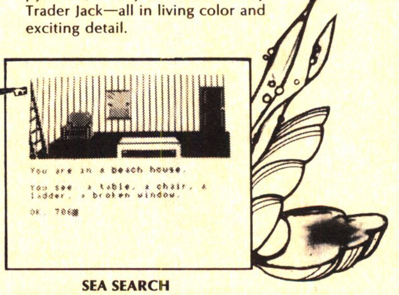
Explore the ancient, mystical tomb of the great Pharoah. Find the magical keys which lead you to unbelievable treasures as you outmaneuver the creatures that slither and swarm about you. Super fast **arcade** action—this one will knock your socks off.



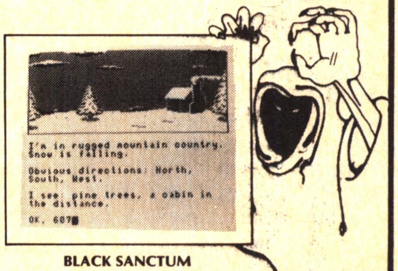
```
You are in a beach house.

You see: a table, a chair, a
ladder, a broken window.

OK, 786█
```

SEA SEARCH

Get your shark repellant and scuba tanks ready! The graphics in this **adventure** are truly outstanding and the underwater scenes are unforgettable. You'll run into a pirate, a mermaid and some hungry sharks in this coloful and unique treasure hunt.



```
I'm in rugged mountain country.
Snow is falling.

Obvious directions: North,
South, West.

I see: pine trees, a cabin in
the distance.

OK, 687█
```

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Major Istar Is An Arcade-Style Adventure With Delightful Graphics

As I worked my submarine down into the deep, dark, mysterious ocean waters, I noticed the Trident Dome, a scientific research station from which I earlier received a cry of help from Huey-14, a service droid. As I worked my way through the ocean waters trying to find clues to aid my quest and save the Trident Dome, I noticed a lot of huge air bubbles rising from around the docking chamber of the Trident Dome. Quickly, I grabbed my joystick, clutched it tightly in both hands, and dodged the air bubbles in order to dock my sub. Several attempts later I was docked.

After leaving the safety of my sub I started wandering endlessly, searching for more clues to end this perilous journey, when all of a sudden I came upon a room full of guard robots. Again, I grabbed my trusty joystick, dodged and out-maneuvered the robots as I worked my way to the top when suddenly . . . well, you guessed it, I was killed.

As I slowly relaxed my legs and pried my gnarled fingers from around the joystick, caused by the excitment of being a superhero, I thought about how it is a dirty job, but somebody has got to do it. Next, I was greeted with a screen asking me if I would like to play again; as I depressed the 'Y' button with my still twitching finger, I found myself back on the water's surface.

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KRT Software Inc.
P. O. Box 41395
St. Petersburg, Florida 33743

I am Major Cameron J. Istar, but you can call me Major Istar (pronounced *eye-star*) for short. Again, I plunged my sub into the dangerous waters only to find myself in the obituaries again. This is definitely not what it is cut out to be! At that point, I decided to leave this Adventure to those of you who enjoy pulling handfuls of hair from atop your heads. But it sure is tough trying not to be a hero after one has had a taste of it. I found myself pulling on the old superhero boots and getting back into my sub again, but this time everything seemed to be going so well, I found all of the objects and clues needed to end the Adventure. Well, believe it or not, I beat it! I started jumping up and down and laughing hysterically; I noticed my wife and children moving to the other side of the room. I then decided to settle down.

Major Istar is a full-graphics Adventure with two action-packed, arcade-style games in one dynamite package. This is the only arcade Adventure I have seen on the market and hopefully it won't be the last. *Major Istar* is offered by Computerware and played on a 32K Color Computer or a TDP-100. The documentation is written well enough to get you started, but it usually does not take much to explain how to play an Adventure.

I have been playing Adventures for years and have beaten some of the best around; usually they are all text Adventures, so *Major Istar* was a refreshing break from the normal Adventuring, using the Color Computer's graphics capabilities to create an Adventure of a high caliber.

Major Istar can be backed up, but cannot be executed, meaning you can back up the program on a standard formatted disk and store it in a safe place. If for some reason you are not able to load your original copy, you can then rebuild the backed-up copy onto the original disk (as long as the original disk is not damaged).

I would highly recommend *Major Istar* as a beginner's Adventure, but on the other hand, I also recommend it to the more experienced Adventurer who enjoys fine graphics and would like to see what they are doing for a change.

This Adventure brings the superhero out in all of us — just don't get carried away around your family! They might not be as understanding as mine was.

(Computerware, P.O. Box 668, Encinitas, CA 92024, cassette $24.95, disk $27.95)

— Bob Brown

One-Liner Contest Winner . . .

Kaleidobox is what it sounds like — a kaleidoscope of boxes.

The listing:

```
0 PMODE1,1:PCLS:SCREEN1,1:FORX=0
TO65535:FORY=0TO50:R=RND(129)-1:
S=RND(97)-1:C=RND(4):COLORC:LINE
(R,S)-(255-R,191-S),PSET,B:NEXTY
:PCLS:SOUND160,1:NEXTX
```

Greg H. Taylor
Naperville, IL

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

The Battle Rages On With *BUGS-II*

I really enjoy good Adventure games. The only thing I don't like is once an Adventure game is solved, the game is no longer any fun; the challenge is over. Roland Knight and Dave Shewchun of Four Star Software have combined the mystery of an Adventure game with the real-time fast action of an arcade game. They call this excellent combination *BUGS-II.* I am not sure what became of "BUGS-I," but *BUGS-II* is a refreshing change of pace when compared with other Adventure or arcade games.

If you are an Adventure game fan, put *BUGS-II* on your list of games to check out. The scenario is one of a returning commander of a deep space mission. After passing through a space storm, the ship's environmental system fails and results in cryogenic suspension for the crew. Awakening over 500 years later and returning to Earth, it is discovered that apparently a nuclear war has been fought on Earth. A message from Earth appears to say Earth has been invaded by intelligent bugs. Humans are treated like animals and, among other things, hunted for sport.

A resistance has formed on Earth, but they need your help. The bugs' power reactor is located somewhere in an underground maze. The resistance has hidden supplies and equipment in the maze. Your returning ship, the Andromeda, has one "land bug" (all-terrain vehicle). It only holds one person, so you, as the commander, must go down to Earth and find the reactor and destroy it. "You must destroy the reactor hidden deep within the maze of bugs. If you do not succeed, it will be the end of the human race. Their fate is in your hands . . ."

As I said earlier, there are supplies and equipment hidden throughout the maze. These include missiles and different kinds of keys, and other useful things. Some barriers in the maze can only be opened using specific equipment. You soon find there is a sequence that must be followed in certain instances, i.e., the purple key must be used to get the Polaris missile which will allow you to get the green lead key, and so on.

There are six levels of mazes on the disk and three levels on the cassette. I received both versions but fought only with the disk version, and then only to get past the third level. (After all, I do have deadlines to meet.) Besides maze levels, there are four skill levels and I played level one all the time. But once you have reached a higher maze level and are killed, the next time you play, you can go directly to that level or any of the preceding levels if you so choose.

There is a pause feature which stops the play with the maze still on the screen. This is great for helping map out the maze. A map is essential unless you have a photographic memory. I would also recommend that you write down what you used to get past the different barriers. You have the option of playing the game with joysticks or the keyboard. I found the joystick much better since I could use one hand to shoot and move my land bug. The game supports either one or two players. I did not like watching someone else play; I wanted to get in there and get frustrated myself.

If you are more of an arcade game fan or just haven't played many Adventure games, you should still plan on taking a close look at *BUGS-II.* It is very fast-paced, even on level one, and you must be on your toes constantly. You will be thankful for the pause feature, just to allow you to breathe. The graphics and sound are done very well. Normally, at the beginning of the game, you will have five land bugs, but there is a practice mode that will give you 10 land bugs. At every 10,000 points, you are awarded an additional land bug.

Occasionally, you will find yourself (notice I didn't say *may* find yourself) in a position from which you cannot get out. You may have used the right key, but at the wrong time. Well, the game comes with a suicide button; pressing 'R' will cause the game to restart and, of course, you will lose one land bug.

BUGS-II requires 64K and is available on disk or cassette. This is the first program I have seen from Four Star Software, and if this is the type of work we can expect to see come out of Ontario, then I can't wait to see what they come up with next. This will be hard to beat. Four Star Software lives up to its name with *BUGS-II.*

(Four Star Software, P.O. Box 730, Streetsville, Ontario, Canada L5M 2C2, cassette $19.95 (U.S.), $24.95 (CND); disk $26.95 (U.S.), $32.95 (CND) plus $2.50 S/H)

— Dale E. Shell

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For Glory, Defeat *The Spanish Armada*

As an engineer in the defense industry with the oddity of a college minor in Elizabethan literature, I was certain to be intrigued by a computer product titled *The Spanish Armada.* Little did I realize that it would keep me up until 2 a.m. every night for a week. I still am unable to consistently beat the Spaniards. Along the way I certainly have enjoyed the nightly carnage, as I single-handedly mismanaged Her Majesty's Royal Navy into total oblivion.

This game is as close to flooding a 32K CoCo as anyone would dare try. Both the tape and disk versions are supplied on one cassette. Having just converted to disk, I tried putting the disk version up first. After three days of frustrating partial successes, I called Picosoft. The owner, Ed Hetzler, provided the kind of friendly, intense support that gives the CoCo owner confidence in Ed's future products.

The utility which had removed unnecessary spaces from his BASIC code proved incompatible with my DOS, and the lack of room for adequate garbage collection often caused my system to crash. Having proven that the cassette version worked nicely, and having a list from him of the dozen lines that are different in the two versions, I was able to install and run both versions soon after.

If you have problems with the game, the first step is to simply unpack the BASIC code that handles the game-save feature (lines 324-332 and 572-579). Add all the spaces back in, `PCLEAR 1` and you will probably run almost at once.

The game is played on a semi-graphics map of the English Channel. At first glance it seems crude, but so is a chessboard; like chess, *The Spanish Armada* has subtleties that are addicting and challenging. Your task is to use a fleet less than half as strong as The Armada to maintain sea control of the Straits of Dover and prevent Parma's invasion. Failing that, you must defeat Parma on land with an army which lost its best troops and most of its equipment in Flanders earlier. The strategic similarity to Dunkirk and the Battle of Britain is uncanny, and just as in 1940, you must rely on outstanding generalship (and a lot of luck) or be beaten to a pulp.

I have read many accounts of this 1588 battle, but the short one in the four-page instruction booklet is among the most entertaining one can find. It very concisely but graphically lays out both the strategic issue and the tactical limitations. Hetzler's writing is almost as entertaining as his game. Unfortunately, this leaves his booklet too short to cover such practical questions as "how do I get out of the cannon-firing loop without losing a move?" (The answer is you don't, so do not fire your ammunition wastefully!) If you speak BASIC even haltingly, you can probably dig all such practical points out of the code, but I hope his next instruction book is a little longer.

The mental effort to combine so many of the practical problems of the naval and military world of 400 years ago into one game, and yet be consistent over 600 lines of complicated code, must have been intense. I speak a number of programming languages rather fluently — I've earned a good living at it — but I have great admiration for Hetzler's ability to pack so many features into a BASIC game. It is among the more challenging and interesting of the war-gaming set.

In summary, if you enjoy a stimulating and challenging mental exercise, and would like to fancy yourself bossing around Sir Francis Drake and the like, this is the way to do it. The fascination of chess is combined (via fickle winds and a random number generator) with the suspense of high stakes poker — and all in only 32K of CoCo.

(Picosoft Games, P.O. Box 35, Eighty-Four, PA 15330, cassette $24.95)

— H. Larry Elman

One-Liner Contest Winner . . .

2010 is a dazzling display of high-speed graphics inspired by the recent film. Enter `PCLS` before running this one.

The listing:

```
1 POKE65495,0:IFTR=0THEN:FORX=10
00TO1STEP-10:PMODE4:SCREEN1,1:PO
KE65314,RND(250):Z=RND(255):Y=RN
D(255):LINE(128,96)-(Z,Y),PSET:F
ORTR=1TOXSTEPX/2:NEXTTR:NEXTX:RU
N
```

Dave Lucas
Watonga, OK

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

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The Rainbow, December 1984

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Color Micro Journal, February 1985

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Disk . . . $23.95 **Tape . . . $21.95** **Assembler source listing . . . Add 3.00**

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Tape . . . $21.95 (16K required) See July '83 review.

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Spreadsheets Choose Sides With *SIDE WISE*

SIDE WISE is just the program the doctor ordered for individuals who like to use their CoCos for business purposes. When I first saw it, I knew it would be valuable for those of us who have wide spreadsheets and narrow carriages on our printers.

I had quite a time getting ready to do this review. Not only was it a kind of hurry-up call from my editor, there were things about *SIDE WISE* that made it something more than the ordinary review.

I was elated to open the reviewer's package and find *SIDE WISE*. As an owner of *Pro-Color-File*, I was sure the product would be what it was advertised to be, but I was curious to discover how the program works and what, if any, application it had to my uses.

The documentation consists of six pages stapled between two sheets of blue paper. The instructions are clear and to the point. The step-by-step method leads you through the moves needed to get a program into *SIDE WISE* and print it.

The introduction tells you *SIDE WISE* will access any ASCII file stored on disk and print it out sideways down the page. The documentation goes on to say the program will print not only speadsheets, but will print out listings or letters which have been stored in an ASCII file. I think that two essential points must be made very clear. The file *must* be ASCII and the width must be set to the width of the copy, or the program will not work.

If you are using *DynaCalc*, that means you should save your worksheet using the "slash-o" option and setting the page width to how wide your sheet is. I got around this by setting all my examples to 255, but if you want to carefully count your worksheet out, be my guest, but be accurate or *SIDE WISE* will fold your sheet as neat as pie. If you are using *VIP Calc*, you must save the spreadsheet to disk using the print-to-disk command which assigns the extension VIP rather than the more familiar SHT. This is the only way the program will work properly. You must be familiar with your spreadsheet's method of saving to disk in ASCII.

The first time I used *SIDE WISE*, I followed the directions on the sheet and did everything the prompts said. I had a spreadsheet I had saved on *VIP Calc* which I wanted to print. I had not saved the sheet in ASCII and therein I was to find the rub.

When I did all I thought I was supposed to, the disk drive whirred and the dreaded error message appeared on my screen. It was the elusive IE Error which indicated my material was not loading because *SIDE WISE* was reading past the end of the file.

I sprinted to the phone and got Dennis Derringer on the line. I told him about the alleged error and the two of us decided the structure of the VIP programs was the culprit. I was not aware at the time that I was not saving in ASCII as the program requires.

I was in a hurry to get this review finished and Dennis suggested an alternative — purchase *DynaCalc* — which we all knew would work with *SIDE WISE*. I had planned the purchase anyway, so I ordered by phone.

DynaCalc arrived in just a couple days and I first had to adapt some spreadsheets for use with that program. It is, by the way, clearly superior to any spreadsheet I have used thus far. I input one of my normal spreadsheets which is too wide to fit on my DMP-200.

Again following directions, I loaded the spreadsheet into *SIDE WISE*. It worked!

I first tried to print at 600 Baud. The program loaded just as the directions said it would and when I asked it to print, it began a rather slow process of creating a spreadsheet lengthwise on the paper. The character set created was very pleasing to the eye, but the progress was slow.

SIDE WISE basically redraws your spreadsheet on its side using the graphics mode of your printer. It is set to use the Radio Shack printers as well as Epson, C. Itoh, Okidata and Gemini.

You also have the choice of condensed or standard font and can make that choice from the menu. The actual printing is done in machine language, but there are certain controls you may change. They are identified in the documentation.

It was some time after practicing with *DynaCalc* that I decided to read over the *VIP Calc* manual and found my error. The *VIP Calc* files printed to the disk worked like a charm.

Like any product Dennis Derringer produces, the *SIDE WISE* program is intended to be a workhorse and be an asset to the owner. He offers in the documentation to help you with printer problems in a unique and honest way. He says if you have serious problems, you can send him a copy of your printer manual section on graphics and he will revise the program as needed and send you the proper patch. If he can't make it work, the document says you can return the master copy and the documentation for a refund.

There are not reams to write about the operation of the program. It works, and it works well. I operate it at 9600 Baud and find the speed very satisfactory. I said the 600 Baud was slow, but if you don't mind it, it still gets the job done.

This is a superior program which does everything it says it will. It is produced by a firm with an excellent reputation for service and it is well worth the money.

(Derringer Software Inc., P.O. Box 5300, Florence, SC 29502, disk $19.95)

— **Howard Lee Ball**

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Stop and Relax With CoCo Freeze Frame

CoCo Freeze Frame from Spectrum Projects is another handy gadget making its way into the Color Computer market. This product is a small hardware kit that enables the user to freeze a frame or stop the screen at will, anytime, with just a flip of the switch. There is one exception to that rule and it applies to the use of cassette operations.

CoCo Freeze Frame can make life easier. Long listings and directories can be stopped quickly and effectively before they scroll off the screen.

Think about this: a permanent pause feature for all those games we have. Our little ones cannot destroy our super high scores before we get into the RAINBOW "Scoreboard" by playing with the keys or the joysticks. Phone, here I come!

This little device (two inches by three inches) attaches to the outside of the computer with a piece of double-sided tape. Two wires run inside and clip on to wires 3 and 33 of the ROM port. There is no soldering. The instructions take you step-by-step through the whole process and CoCo Freeze Frame can be hooked up in about 20 to 30 minutes.

The price is steep, $19.95 plus $3 S/H for what you get, but if you're not a do-it-yourselfer CoCo Freeze Frame can uncomplicate your life.

(Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, $19.95 plus $3 S/H)

— Stephen Hess

One-Liner Contest Winner . . .

Leaky CoCo should be painfully familiar to anyone who has had a leaky faucet in the house.

The listing:

```
0 PMODE3,1:PCLS3:SCREEN1,0:COLOR
1,3:X=RND(170)+41:CIRCLE(X,2),4,
1,1:Y=RND(75)+96:FORT=6TOY STEP6
:PSET(X,T):FORR=1TO15:NEXTR:PRES
ET(X,T-6):NEXTT:PLAY"O4T250BP1C"
:FORD=6TO128STEP6:CIRCLE(X,Y),D,
1,.15:CIRCLE(X,Y),D-6,3,.15:NEXT
D:GOTO0
```

Rolf Tornow
Schofield, WI

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Multi-Pak Extender Cable Goes The Distance

Spectrum Projects has responded to a real need with a high-quality extension cable. Until now we have been limited to 18 inches of extension cable for the Multi-Pak, because anything longer gave off too much interference (radio frequency).

The Multi-Pak Extender Cable is about 25 inches of quality shielded cable with gold edge connectors on each end. The cable is usable with the Radio Shack Multi-Pak Interface or the PBJ Expansion Bus.

The cable is on the stiff side and not very flexible.

Now, Spectrum Projects has added a reinforced grounding provision. I was able to test the cable on several models of CoCo without any problems.

I encountered some minor problems installing the cable snugly into the computer because the door covering the ROM port kept this from being an easy task.

No installation instructions are given, and are really not necessary. A word of caution here: Examine the cable, and note the ground wire. This is the extra wire running through the shielding. This wire should be on the bottom towards the front of the computer or else you might ground something you had not planned to.

(Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, $39.95 plus $3 S/H)

— Stephen Hess

One-Liner Contest Winner . . .

Enterprise shows the Federation starship fleet obliterating a star field. It uses the `GET` and `PUT` functions of Extended Color BASIC.

The listing:

```
1 DIM Z(16,7):PMODE4,1:SCREEN1,1
:PCLS:FOR X=1 TO 200:PSET(RND(25
5),RND(197),5):NEXTX:DRAW"BM1,2;
C5R5L1D3L1R8D1L8R8U1L1U3L2R5L2U1
L1D1":GET(0,0)-(16,7),Z,G:FORY=1
TO188STEP9:FORX=1TO239STEP2:PUT(
X,Y)-(X+16,Y+7),Z,PSET:NEXTX:NEX
TY:RUN
```

Devon Copley
Amherst, NY

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Software Review

Effective Drills And Musical Thrills With *Primary Number Skills*

Primary Number Skills, by CY-BURNET-ICS, is an educational program for preschool through second grade children intended to provide practice in early numeration skills such as number matching, recognition, sequence and counting by ones, twos, fives and tens. Twelve numeration drills are provided via a menu, with all drills using large yellow numerals on a blue background. Minimal supervision might be required for the younger children.

Primary Number Skills is available in two versions. The talking version provides synthesized speech as a help mode on all drill levels and is designed to be used with *The Voice*, a speech synthesizer from Speech Systems. The music version includes musical rewards (in four-part harmony) for completion of every 10 problems, but does not utilize synthesized speech.

Both versions use graphics rewards (in the form of stars for correct answers) and function primarily the same. Therefore, comments pertain to both versions unless otherwise noted.

Primary Number Skills is written in BASIC, but uses a machine language preloader to automatically load and run the program.

Menu options 'E' and '0' are essentially matching games where yellow numerals, zero through nine, will start out three-fourths of an inch in height and "step out" of the blue screen towards you until they become five inches tall (on a 13-inch TV). At that point the child must match that number by pressing the corresponding number on the keyboard. Incorrect answers do not appear on the screen and have no effect. Correct answers will erase the old number and result in a new number appearing.

Option 1 continues the matching drill into the higher 10 through 99 number range, with a stationary two-digit number appearing on the screen. The size of the numerals are now reduced to three inches on the screen. Since there are two digits on the screen at this point, answers must be entered reading left to right. An arrow appears sequentially above each digit of the number showing the child which number he has to match on the keyboard.

In the "next number" (menu item 2), the graphics letters have been decreased in size to one and one-half inch as the number of numerals on the screen now increases to four. A two-digit number is displayed on the left of the screen and two blank lines are inserted on the right of the screen, indicating the next number. The child must enter the next number, filling in the blank lines from left to right.

Options 3 through 'T' all follow the same pattern, i.e., all the numerals are now three-fourths of an inch and there is a pattern or sequence of at least five numbers appearing on the screen, with a blank line or two in the middle of the sequence where a one- or two-digit number has been left out. It is then the child's problem to figure out what the missing number is in options 3 through 'T.' In menu items 3 through 5 the child is counting by ones within various ranges of numbers; items 6 through 'T' consist of

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counting by twos, fives and tens within various ranges.

Throughout these drills, two control keys, 'Q' and 'H,' are helpful for the kids to remember. A brief description of the two keys is flashed on the screen after each menu selection to help kids remember the keys' function. The 'Q' key allows the child to Quit at any time during the drills and return to the menu. The 'H' key will provide Help according to the version of the program you are using.

In the talking version, the answer will always be spoken by the computer in addition to being shown on the screen for one or two seconds. The music version will only briefly display the correct answer. 'Q' and 'H' are the only two keys that are functional beyond the numeral keys, as the program disables the BREAK key and ignores all other key input.

Primary Number Skills uses a series of stars for graphics rewards. On levels 1 through 'T,' a display of 10 stars appears at the bottom of the screen and one star disappears after each correct answer. After completion of 10 problems, the original stars at the bottom of the screen are gone and the whole screen fills with stars. The talking version returns to the menu; the music version rewards you with a random musical selection of one of three songs ("Yankee Doodle," "My Country Tis of Thee," and "Grand Old Flag") before returning to the menu.

I have two kids who have used this program extensively (ages 5 and 7). My 7-year-old has always been a well-above-average math student, so I think he probably has not found this primary number skill program as challenging as other children his age might have. Nevertheless, he seemed to use the program a lot and enjoyed the exercises.

Primary Number Skills proved to be a rather timely review for my 5-year-old daughter as she spent a week home with the chicken pox! I was amazed at the interest, enthusiasm and progress she had shown in only two or three weeks using *Primary Number Skills*, even in the more difficult counting levels. She seemed to be thoroughly motivated and entertained.

If my kids and I had to choose between the music version or the talking version, we would definitely pick the music. The kids enjoy the four-part harmony music tremendously! It really seems to motivate the kids. The music is short, one phrase long and played just long enough to entertain and provide a reward, but not too long to distract from the learning process.

No matter how much time is spent developing a program, even a commercial program, one always seems to come up with another idea, improvement or modification of some sort. If I were to improve upon the program, I would combine the music and voice into one program running from a 64K machine if need be. I had made this suggestion in a previous review of one of CY-BURNET-ICS' other programs. I am happy to say that CY-BURNET-ICS has decided to expand some of their software to 64K, so in the near future you will see music, graphics and voice all integrated into one program for those with a 64K machine and *The Voice*. Until then, if you purchase the talking version, the music version will also be sent on the same media and you can decide for yourself which program to use.

One other suggestion I would make might be to vary the position of the "missing numbers." Take a look at menu option 9, which is counting by tens. All of the program options 3 through 'T' have the same format, i.e., display a couple numbers, leave a blank number, display a couple more numbers, then the child must enter the missing number. In option 9, the child is left with only five of nine numbers to work with. That is to say 10, 20, 80 and 90 will never be numbers that can be entered by the child because they are on the "display" edges of the possible sequences. The alternative to this is not to place the missing number in the middle of the sequence all the time, but rather to vary the position from beginning to end in drills 3 through 'T.'

Aside from the personal modifications I would like to see, *Primary Number Skills* is an excellent program as is. It provides a good variety of early number skills drills in an entertaining, motivating and easy-to-use program. My daughter would highly recommend it; I would too!

(CY-BURNET-ICS, 5705 Chesswood Dr., Knoxville, TN 37912, 32K ECB, cassette $29.95, disk $32.95. Add $5 for Talking Version which includes copy of Music Version.)

— Kenneth D. Peters

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PAINTPOT Can Help You Create Sophisticated Graphics

As soon as I saw my first video arcade game, I had to know how they did the graphics and animation. So, I bought the best graphics-oriented home computer I could find: the CoCo. Then, I typed in every BASIC graphics/animation program I could get my hands on. I found it interesting, but slow.

Next, I tried machine language. That was fast, but ever so difficult. There has to be a way to do all this easier, and, of course, there is. The professionals use graphics and animation utilities on mainframe computers. They then download the information to target microprocessors on the host arcade game. And like magic (and many "people years" later), they have something like *Donkey Kong*!

Lately I've been reading a lot about graphics utilities for our very own computer. Every month in THE RAINBOW, I see how they just keep getting better and more sophisticated.

What should arrive in the mail the other day from my favorite magazine? Naturally, a graphics utility program to review! It's called *PAINTPOT* and was written by Tim Skene from Montreal.

This graphics utility, written in ECB, will run on any CoCo from 16K to 32K, cassette or disk, and is not copy-protected (hurrah!). The disk version I received had two versions of *PAINTPOT*, one for color TVs and one for monochrome TVs (each uses a different color set), and several sample screens which were very impressive. (Also included was a *Slither*-like game. It was simple, but fun to play.)

PAINTPOT uses `PMODE1` and four colors to do "sketches, doodles and graphics designs." `PMODE1` gives a resolution of 126 by 94 dots and allows for four full graphics screens with 32K to do some simple animation. You can use the keyboard, joystick or mouse to create your masterpieces. One very nice feature is the ability to put text with the graphics (31 by 15 characters per screen).

This utility provides several very powerful functions to help create the graphics. These are paint, line, box, circle, text and animation. Some of these may sound familiar if you've been reading your CoCo manuals. The major difference is the functions under *PAINTPOT* are infinitely easier to use. Just position the cursor with the arrow keys (or joystick/mouse) and press the appropriate key. That's it! Almost instant graphics.

If it gets late and your bleary eyes can't stare at the screen any longer, no problem; just save what you've done to disk (or tape) and recall it later to finish. If you forget a command, just type 'H' or '?' and the Help screen will refresh your memory by listing all 18 different commands.

The 17-page manual is simply written with more than adequate information to use this program to the fullest. Also included is information needed to use the graphics screens from a BASIC program or as stand-alone art. This utility allows you to enter direct BASIC commands from the keyboard to generate complex designs and then use or modify them from within *PAINTPOT*.

I'm not much of an artist so I haven't created any Van Goghs using this program, but my son, Tim (age 11), and I have had some fun drawing caricatures of each other. I even managed to create a "space invader creature" with roving eyes and flapping arms.

Tim was too impatient to read the manual, but I explained some of the commands to him and let him loose. As he mastered the commands, I would explain others and he was doing well after a very short time.

We both noticed the keyboard response was a little sluggish. It would take several pushes of the arrow keys to get the cursor to move one pixel. The cursor blinks very fast and it's hard to determine its color. The cursor is much larger than the dot it leaves behind and it took some time getting used to using only the upper right-hand corner of it to position the points I wanted.

I tried using the joystick (slightly better quality than the Radio Shack originals) and that was a disaster. I'm sure with some practice I could have done better, but I'm impatient, too. The author recommends using a mouse and I agree that would be the way to go.

The disk I/O is very straightforward and pretty much idiot-proof. I know because I usually manage to crash a program somehow, but not this one. In fact, if you should stop the program on purpose or by accident, your previous work is not lost. A simple `GOTO1` restarts the program without reinitializing anything or erasing the graphics pages.

While this program won't replace a mini-computer utility, it does present, in a simple form, the basics of graphics and animation. You probably won't be able to create a prize winning arcade game, especially with its limited animation, but you certainly can use it to do some serious "sketches, doodles and graphics designs."

The program is simple to use and simple to understand. It's written in BASIC so it can be modified. If you're looking for some help creating graphics, this utility could be a good place to start.

(Tim Skene, 6073 Durocher Ave., Montreal, Quebec, Canada H2V 3Y7, cassette $20, disk $25)

— C.L. Pilipauskas

One-Liner Contest Winner . . .

Randy Cassel tells us his daughters have fallen in love with the dots game. Each time they wanted to play, Mommy or Daddy would have to draw a grid one dot at a time, and so this one-liner was born. It requires an 80-column printer.

The listing:

```
1 CLS:INPUT"ROWS";R:INPUT"COLUMN
S";C:CLS:PRINT@223,R"BY"C"DOT GR
ID BEING PRINTED":FOR X=1TOC:FOR
Y=1TO80STEP80/R:PRINT#-2,TAB(Y)"
.";:NEXTY:FORZ=1TO3:PRINT#-2:NEX
TZ,X:CLS:PRINT"COMPLETE":INPUT"D
O YOU WANT ANOTHER";A$:IFA$="YES
"THEN 1 ELSE END
```

Randy Cassel
Middletown, PA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

*elec*TRON* Presents A Quartet With A Variety Of Challenge

When I heard Disney was going to do a movie about computers and with computer-generated graphics, I couldn't wait to see it. I wasn't disappointed either — the graphics were fantastic. While I was watching it, I said to myself, "What a neat arcade game *TRON* would be!"

Not long afterwards I saw the game at the local arcade. It was well-done, but those quarters really start to add up after awhile. How I wished someone would make a version for my favorite computer (CoCo, of course)!

It wasn't long before the talented Steve Gieseking (creator of *Planet Invasion* and others) had a version for the CoCo. It is sold by Tom Mix Software and called *elec*TRON*. The game requires a 16K CoCo and two joysticks (sort of). The cassette version I received has an auto-loader (no backups) and executed flawlessly every time I ran it.

After loading, the screen shows a neat title screen and then enters the attract mode. Pressing '1' or '2' for the number of players starts the game. The instruction sheet provided is confusing to read the first time. After the game is played, the instructions become a little clearer with one notable exception — the use of the joysticks. I'm still not sure I understand all the options.

Once you're under way, you have four men to use and four different subgames to complete before moving to higher levels. You get to the subgame you want by moving a small dot in the center of the screen to one of the four unmarked diamonds. Except the first time you start at any particular level, you don't know which subgame you are choosing. If you should not complete the subgame, a token representing that game is placed in the diamond. The second time around, you can pick the same subgame to try again or try one of the other ones. I know this sounds confusing, but you will figure it out very quickly once you start playing.

The four subgames are called *Beam Buggy, Prachnid, Force Field* and *Maze. Beam Buggy* simulates the cycle race from the movie. You have to last longer than the computer's buggies by not hitting the walls left behind each buggy. The first level pits you against only one other buggy, but the higher levels have more.

The *Prachnid* subgame's object is to get to the transporter before time runs out or before being destroyed by the Prachnids. Those little devils keep splitting in half, so don't spend too much time trying to get points.

"A deadly force turns and descends upon you." This is a rotating, descending cylinder of colored force in the subgame *Force Field*. Shoot all of it out or just enough of it to sneak to the top of the cylinder.

The *Maze* subgame is a tank chase in a maze. You have to shoot the enemy three times to defeat it (or them, in the higher levels), but you have to be shot or bumped into only once. (Is this a form of arcade discrimination?)

If you manage to survive to 10,000 points, you'll get another man and another every 20,000 points thereafter. During any of the subgames you can pause for breath by hitting the 'P' key; pressing it again restarts the action.

Control of your man is via the joystick(s). "Method 1: When the right button is pressed, the right joystick then controls the direction you fire and automatically fires for you. Method 2: You control the direction you fire with the left joystick and fire with the left button."

The graphics for *elec*TRON* are very simple, but that may be because this type of game has been around for almost three years. The sound is OK; at least it's not annoying like some of the other games.

"Playability" depends on which subgame you're currently on. The *Beam Buggy* game is pretty exciting, especially at the higher levels when there are several opponents. The *Prachnid*'s are rather boring; you get no points for making it to the transporter, only for killing the critters and they multiply like rabbits! The *Maze* has been very difficult for me. It seems my joysticks aren't very responsive (or maybe the game doesn't read them well, I'm not sure). I also get angry because I have to hit them three times, but I have to be hit only once. The *Force Field* game seems to need both joysticks, but then again, I'm not sure.

With all this uncertainty, I decided to call in my resident arcade specialist, Tim (age 11). After several hours of playing *elec*TRON*, he declared the following: *Beam Buggy* is the best, *Prachnid* is "kinda" easy, *Force Field* is hard because of the joysticks, and *Maze* is really good because it is so hard to beat.

What could I possibly add to that?

(Tom Mix Software, 3424 College N.E., Grand Rapids, MI 49505, tape $24.95, disk $27.95)

— C.L. Pilipauskas

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Micro-Grip V Gives The Option Of Friction Feed

There's a new accessory available for owners of the Epson MX-80, MX-70 and RX-80 printers that makes it possible for you to enjoy the benefits of friction feed for single-sheet correspondence, if your Epson does not have the capability.

It's the Micro-Grip V, a friction-feed kit manufactured by Bill Cole Enterprises, which is designed to allow you to adapt or retrofit your printer to use non-pinfeed paper.

If you're among those who experience an uncontrollable shaking of the fingers when you fumble around inside of hi-tech machinery, be aware that this is one of those kind of projects. If you do the experiment on a friend's printer, like I did, occurrences of the "dropsies" and the "losties" will be twice as bad.

On the other hand, if you have no qualms about removing a few key elements from a printer in order to gain the advantage of friction feed, you will have no problems. Even if you do have the problems mentioned above, you can still complete the project successfully. It will just take you a little longer.

Bill Cole Enterprises has done a thorough job of providing carefully written documentation that spells out in 32 steps exactly how to make the improvement — even including a suggestion to place the printer on a towel in a flat, uncluttered area before you begin.

The kit basically consists of a roller (which provides most of the friction for paper feeding) that attaches to the paper pressure bar on your printer. Two additional polyurethane spools replace the original paper guide roller that came with your printer on the platen bar. When complete, the polyurethane spools rest against the new roller to hold the paper in place.

And, despite my fumbling, the process works extremely well, although I did have to retrain myself on the procedures for loading paper.

The instructions also included a hint for shutting off the out-of-paper switch that has proven bothersome on my own friction-feed printer: place a disk write-protect foil or piece of tape over the switch in the platen carrier tray. (Thanks, Bill Cole Enterprises. That had annoyed me for a long time.)

And if you're among Epson users who regret having purchased their printer without the friction-feed option, I'm sure you will thank them, too, for Micro-Grip V.

(Bill Cole Enterprises, Inc., P.O. Box 60, Wollaston, MA 02170, $39.95)

— Charles Springer

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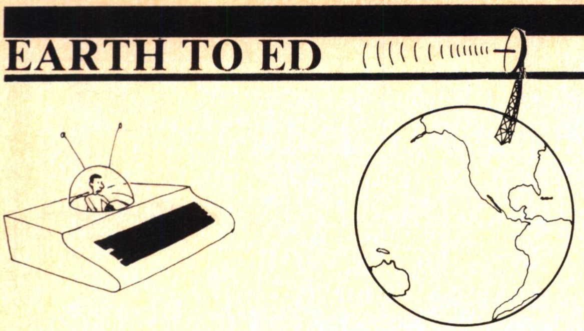

'Washed Out' At Sea

By Ed Ellers
Rainbow Technical Writer

• *I see in your magazine some games (for example, Tom Mix's* Sailor Man*). On the photo, the colors are good, but on my computer the colors are pallid and the red is a mixture from blue and yellow. I had been thinking that my problem will disappear with a video monitor interface, but it didn't. Is it impossible for me to have the pretty colors?*

Alexandre Maggioni
Lausanne, Switzerland

The problem is that your CoCo and color TV are set up for the PAL system. The colors seen in many programs using Hi-Res graphics are called "artifacts"; the colors aren't really in the signal, but the TV *thinks they are* because of the position of the dots. In the PAL system, which is similar to the NTSC system used in North America but has a few added twists, this relationship does not exist and the artifact colors are lost.

The only solution I know of (and it's not really practical) is to get an American CoCo (and a step-down transformer to convert your AC power down to 120 volts) and use it with a multi-standard TV set. These sets are designed to work on NTSC, PAL or SECAM transmissions, so that you could receive, say, both French (SECAM) and Swiss (PAL) TV networks and also use it with an American NTSC CoCo.

(Ed Ellers, a RAINBOW and PCM staff member, is a self-confessed electronics fanatic whose other interests include science fiction.)

Copy Rights and Wrongs

• *Every program in your magazine is copyrighted. Do all programs you receive have to be copyrighted? How do you go about getting a program copyrighted?*

Trent Jackson
Webster City, IA

Programs submitted to the RAINBOW don't have to be copyrighted by the authors, although many are. Copyrighting a program is not a particularly difficult process; it basically involves placing a copyright notice in the program itself (where anybody who gets the program will see it) and depositing copies of the program and a printout of the source code with the U.S. Copyright Office. I do urge you to write to them for details and a registration form. The address is:

Registrar of Copyrights
Library of Congress
Washington, DC 20559

Do They All Work?

• *I have a 16K Extended CoCo. I was wondering if all the programs on RAINBOW ON TAPE are compatible with just 16K.*

Jeff Wilson
Macon, MO

Some programs require 32K Extended BASIC (or even disk); some need 16K Extended; some will work on 16K non-Extended machines, or even 4K. It's a good idea to check the "key box" at the upper right corner of the first or second page of the RAINBOW article to see which configuration is needed. I can't emphasize too strongly that you do need to read the articles to know how to use the programs.

MC-10 Terminal Programs

• *Could you please let me know who has a program to use the MC-10 as a terminal?*

Roger Koach
Apple Valley, CA

Radio Shack sells one called Micro Color COMPAC; Spectrum Projects also has one.

BASIC09 Backup

- *I have OS-9 and BASIC09, and I would like to know how to make a backup of the BASIC09 disk. I could not find any mention of it in the BASIC09 reference manual.*

Capt. John J. Diamond, Jr.
Osan Air Force Base, Korea

You'll find backup procedures in the *Getting Started With OS-9* manual; it's basically the same as backing up OS-9 system disks except that after the backup program is loaded you need to take out the system disk and insert the BASIC09 disk.

Assessing the Value of a Joystick

- *I can access my joysticks through machine language programs fine. Through BASIC, I have to read both joysticks, otherwise I get incorrect readings that don't change. Do you know of something that might cause this?*

Nick Kritikos
U.S. Embassy, Athens, Greece

BASIC's joystick-reading routine is called whenever your program uses the function `JOYSTK(0)`. It actually gets the values of both joysticks in both directions, but the other values aren't reported until your program calls them. This is done so that only one call is made no matter how many values need to be checked.

Using Atari Joysticks on the CoCo

- *Are there any cables that you know of that would allow me to use an Atari or Wico joystick on the CoCo?*

Jordan Sparer
Nanuet, NY

Wico makes an adapter for their joysticks (and many other Atari-compatible ones) to work on the CoCo.

Something New Has Been Added

- *I recently bought two Radio Shack Deluxe Joysticks. When the salesman took them off the shelf, they were in different-sized boxes. The joystick in the larger box had an additional fire button.*

P.S. Can you tell me why my joysticks won't work vertically?

Jon Nash
Tulsa, OK

Tandy has recently revised its Deluxe Joystick (which is the same as a Kraft joystick often sold for Apple IIs and IBM PCs; IBM also sells it for the PC*jr*) to provide two fire buttons when used on the Tandy 1000. This new computer is designed to be compatible not only with the IBM PC but with the PC*jr*, and this change lets Tandy 1000 users play PC*jr* games supplied on disk. The new joystick works fine on the CoCo, but the second button has no effect. As for the vertical locking, the spring return levers on the bottom of the joystick will often do this when used incorrectly. Look at the instruction sheet to see how to unlock it.

Debunking Some Rumors

- *I am writing to ask about the rumored (long ago) video generator chip for the CoCo which would produce 500 x 700 pixel graphics with many colors. Is it still being made? How much will it cost?*

Also, what about an adapter so that the CoCo can use Atari cartridges? Is it still in the making or did it die a rumor also?

Terry Steele
Summerfield, NC

The video generator you're talking about is the Motorola RMS chip set, which is designed to be used in systems based on the 6809 microprocessor used in the CoCo as well as the 68000 processor used in a number of systems (the Tandy 6000 and Apple's Macintosh are two examples). This is not something you could just plug into an existing computer, so it's not in sight as a CoCo upgrade. As for the rumored Atari cartridge adapter, I seriously doubt that one will be coming out; the CoCo is so different from Atari systems that it wouldn't be practical. (The ColecoVision adapter that uses Atari 2600 cartridges is really a complete game machine in itself; about the only parts of the ColecoVision or ADAM console that are used are the power supply and RF modulator.)

64K Off and On

- *About four months ago I purchased a 64K upgrade kit and installed it myself. I have an 'E' Board machine; the kit I bought had the U11 and U29 chips prewired and included.*

During installation I accidentally broke off pin 5 of U11 and instead soldered the wire right to the chip. When the full 64K worked properly, I forgot about the problem. Recently, some of my 64K programs stopped working, and a quick 64K check proved that it is indeed not working. My problem is that I do not want to buy another full 64K upgrade kit just to get these chips. Does someone make or sell the U11/U29 set with jumpers, or even the chips themselves?

Aaron Martin Franser
Revelstoke, British Columbia

I don't know about the wired pairs, but the two chips can be found at many electronics parts stores; U11 is a 74LS138, and U29 is a 74LS02.

Can POKE but not PEEK

- *I have assembled a general purpose I/O board described in* BYTE, *but I seem to be unable to effect the* POKE*s to the memory locations that the board uses. Whenever I attempt to verify a* POKE *by* PEEK*ing the location, I constantly get a result of 255. Can you explain?*

Ralph Coleman
Churchville, NY

Apparently the board's logic at those locations is write-only; when you PEEK them, no response comes from the board and you get a result of 255 from the open circuit. The SAM chip addresses (such as 65495) are the same way.

A New Printer . . . but Will it Work on the CoCo?

- *Is the new Okimate 10 color printer compatible with the CoCo, or can it be modified to work on it?*

Charles Baker
Bakersfield, CA

The Okimate 10 has a parallel interface, so it should be possible to use it with the CoCo. I'll note that Okidata sells "Plug'N Print" packages for the Okimate 10 for use with the Atari and Commodore 64 computers, but none for the CoCo as yet. Since the kits include ribbons, you'll probably need to buy a ribbon separately.

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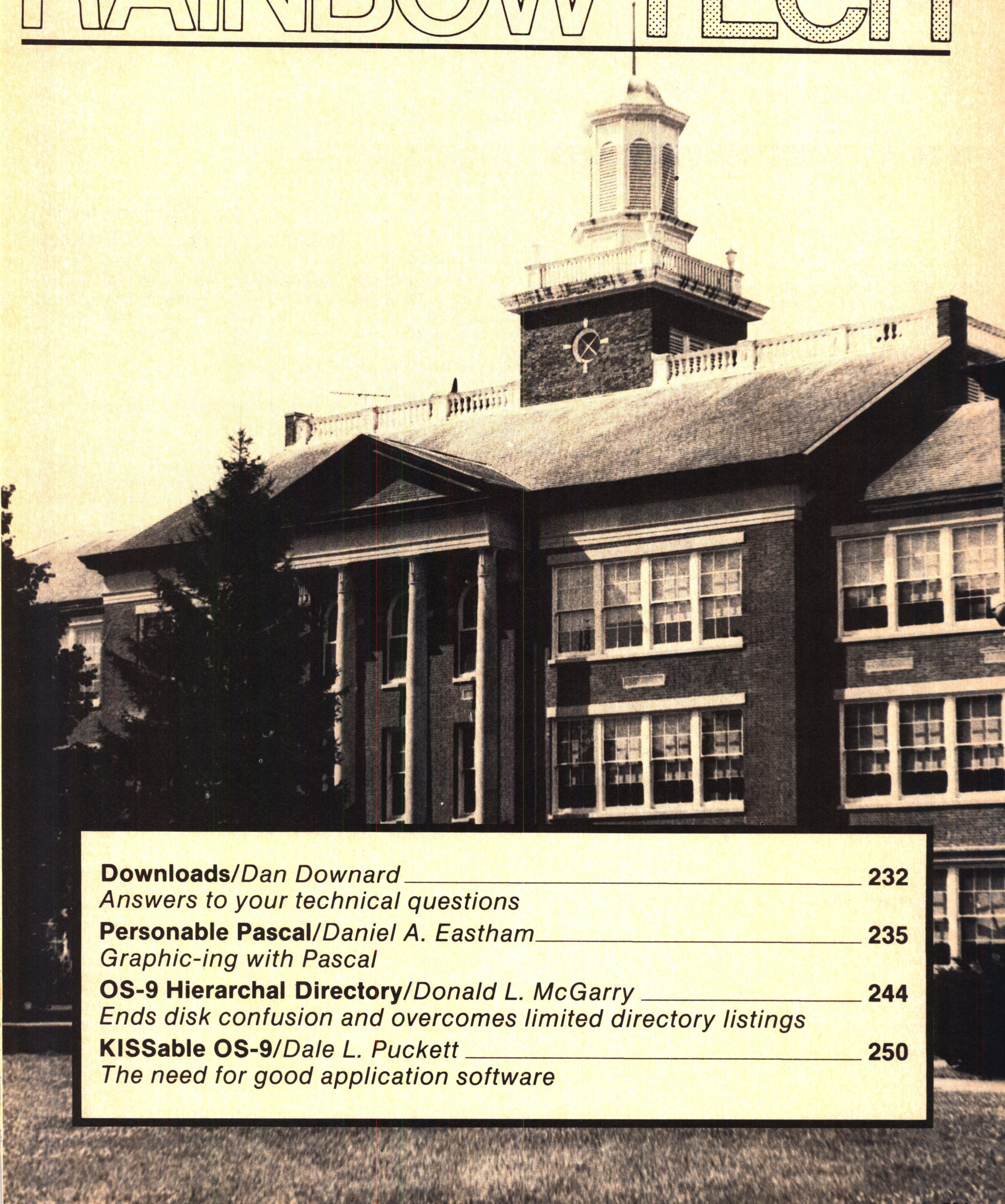

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A Lesson In C Compilation

By Dan Downard
Rainbow Technical Editor

• *I was wondering if you could run a C tutorial or give me some advice. I have been having difficulties getting any program to compile correctly. Even the first program in the book,* The C Programming Language, *gives me an "unresolved references" error from the linker. This error isn't even listed in the Radio Shack guide! I would appreciate any help.*

Paul Keller
Wayne, PA

Paul, I had the same problem recently. Unfortunately, 35-track disk drives were the problem. On the Radio Shack/Microware C compiler disk, space is at a premium. Since C has to open several temporary files in your working directory, compiling a long program can really present a challenge.

If you examine the free space on the Library Disk, though, you are in somewhat better shape. I made a backup of the Library Disk, and made it my working directory by use of the CHD /D1 command. The program compiled just fine and the compiled version was still in the execution directory. This type of flexibility is one of the features that makes OS-9 so good.

Needless to say, due to both disk and memory constraints, do not try to compile a C program while using *O-Pak* or any other resident program that requires extra system memory.

COMMUNICATION BREAKDOWN

• *I have a TRS-80 Color Computer with one disk drive, PBH serial-to-parallel interface, Hayes smartmodem 300,* VIP Terminal *program and a standard pushbutton phone. I am connecting the computer to the modem with the PBH interface and a Radio Shack cable (26-3014, serial to RS-232C). I am setting the PBH to 300 Baud. I have checked and double-checked to make sure everything is plugged in correctly, and as far as I can tell, it is.*

(Dan Downard is an electrical engineer and has been involved in electronics for 25 years through ham radio [K4KWT]. His interest in computers began about six years ago and he has built several 68 XX systems.)

Here is what happens: When I type the command AT (ENTER), I get back an OK. When I type the command ATDT9412812 (to dial a number), the modem beeps seven times as though it were dialing a number, but nothing happens.

If I pick up my telephone (plugged into a dual jack), I still hear the dial tone. If I dial the number myself and get the BBS tone on the phone, the modem and program behave as though nothing were there, or it wasn't plugged in to the phone (but it is).

After the allotted time, I get back a "no carrier" message. This happens whether I dial the phone or try to have the modem dial it. I can't get online. I have tried both tone and pulse dialing; neither works.

The people at Radio Shack are helpful but know very little about the Hayes modem or the VIP Terminal *program. The people who carry Hayes modems know nothing about Radio Shack computers. Is there something more I must type? Is my cable wrong? The man at Radio Shack suggested I might need some kind of cable that comes from my ROM pack port. I hope not. Please help!*

John Klein
Honolulu, HI

I am assuming the PBH interface you are referring to, John, is the type that switches between your printer and modem. At the same time, the Baud rate setting on the PBH has nothing to do with the modem; it's just the serial input rate for the serial-to-parallel printer interface. *VIP Terminal* defaults to 300 Baud, so you should be in good shape anyway.

Be sure you are in the uppercase mode when you enter the commands you mention. I have used the exact equipment you are referring to many times, and never had a problem.

If this doesn't work, check your telephone connections. Sometimes when you have a grounded line coming into your house, the installer will not use the standard color code for your phones. I say this because evidently your computer-to-modem connection is working because you are hearing tones, or beeps, from the Hayes speaker.

STATEMENT STUMPER

• *I have had my Color Computer for about three years and have enjoyed writing my own BASIC programs. I have subscribed to THE RAINBOW for two years and I think it's a great magazine.*

In the three years I have had my computer, I do not remember seeing an explanation of the statement in Line 10030 of the screen dump program on Page 269 of the December 1984 RAINBOW. It reads `10030 PP=YY and 127`*. Such a statement is mentioned, but not explained, in Andy Kluck's article in the September 1984 RAINBOW, Page 40. It appears on Page 257 of* Getting Started With Color BASIC *as Boolean algebra. It also appears to me that in this progam "PP" will always end up equal to "YY."*

I would appreciate an explanation of what that type of statement means and when or why a programmer in BASIC uses it. A search of all the BASIC manuals and references I have hasn't helped.

J. M. Dornblaser
Bartlesville, OK

The codes used for the representation of data inside your CoCo are actually eight-bit binary values. Microprocessors can only recognize zeros and ones. Hence, we have the ASCII code, or a standard set of symbols corresponding to each binary value between zero and 128.

What's this have to do with your question? Well, you've heard about the guy that you asked the time of day, and he explained how a clock works.

There are a few functions in BASIC called logical operators. In addition to `AND`, there are `OR` and `NOT`. These are Boolean algebra functions that operate on binary numbers. `1 AND 1 = 1`, but `1 AND 0 = 0`. Therefore, you can use the `AND` function to mask out a bit.

In the case of the line you referred to, `PP=YY AND 127`, 127 represented in binary is 0111111. When you `AND YY`, a variable, with 127, you make bit seven equal to zero, or in computer terms, you "strip" bit seven. You then ensure that "YY" is less than 127.

STEP UP YOUR STEP RATES

- *[I am writing] in response to the question that Mr. Goudie brought up in the "Downloads" column [January 1985] about changing the step rates of your drives. I believe Mr. Downard misunderstood the question in that he commented on various disk "speed" checkers.*

Some drives can handle a faster step rate than the normal 30 milliseconds. I can operate my TEAC and Tandon drives at 20 milliseconds and there is an obvious difference.

To set your drives at the various rates, follow this procedure:

Get in the 64K mode — this can be accomplished with various pieces of software on the market.

For a 1.0 Disk ROM:

```
POKE&HD6CD,0:POKE&HD723,X
```

For a 1.1 Disk ROM:

```
POKE&HD7C0,0:POKE&HD816,X
```

Where 'X' equals one of the following:

23	*for 30 milliseconds*
22	*for 20 milliseconds*
21	*for 12 milliseconds*
20	*for 6 milliseconds*

You will simply get an I/O Error if your drive can't handle the new rate. I have some friends running at six ms with no problems.

Phil Cayton
Texas City, TX

Thanks for the tip, Phil. I'll agree that the faster step rate sure speeds things up quite a bit. At the same time, it makes your drives a little quieter.

IS STRUCTURED EASIER?

- *As you may well know, many of the new disk drives are designed to operate at a track-to-track access time of six ms, while Radio Shack Disk BASIC runs at 30 ms. Even the new Radio Shack disk drives are designed to operate at 20 ms.*

I have Spell'n Fix II. *It allows the track-to-track access time to be varied down to six ms. (That is as fast as the controller will allow.) I happen to have a drive that will run at six ms. The difference between 30 and six ms is astounding; well worth a* `POKE` *or whatever.*

I have been told there is no simple `POKE` *to control the access time as there is for varying the Baud rate. How can we get track-to-track access time of six to 20 ms?*

If it can't be done in "straight BASIC," then can it be done in `DATA/POKE` *ML? It would reach the greatest number of readers that way. Assembler is neat, but few people have* EDTASM+. *Of course, a good compromise would be Position-Independent Code (PIC), but only if it can be hand poked with a Hex loader.*

Another thought which I hope is a quickie: What's the big deal about a structured language? I even read an article by a professor from Dartmouth that was talking about how great SB (Structured BASIC) is. No `GOTO`*s or* `GOSUB`*s; nothing but subroutines. How does one get in and out of subroutines without them, and so what anyway?*

If I write a program in BASIC and I find I have one thing that is done many times over, I set it up as a subroutine, put it up front, `SUB` *to it and* `RETURN` *back. Am I writing structured BASIC? I don't think so. So what's a structured language all about?*

James DeStafeno
Swedesboro, NJ

James, see Phil Clayton's letter above for your step rate problems. Remember, though, you have to be in the 64K mode to use the `POKE`s.

As far as structured BASIC, proponents say it is easier to read. I agree with what you're saying — most of the time. At the same time, in BASIC09, for example, you only use line numbers where you have a `GOTO`, etc. If a subroutine is used often enough, you can make it a separate procedure and call it from several different programs.

If you feel comfortable with BASIC, use BASIC. There's no need to learn another programming language unless you want to, or you're a professor from Dartmouth.

ELUSIVE COMBINATION

- *How does one put BASIC programs into an EPROM for use in a ROM pack? I have an EPROM programmer and have successfully put Machine Language programs in a ROM pack. For some reason, BASIC programs elude the process. Perhaps it's because BASIC doesn't know where the program starts and ends.*

The object is a BASIC program that self-starts from the ROM pack. Assuming one has gotten the source code successfully in the ROM pack, where do the variables end up? Will interactive functions like `INKEY` *and* `INPUT` *still work?*

Brian Alsop
Trafford, PA

Brian, it is very difficult to put a BASIC program into a ROM pack. I'm not saying it's impossible, though. It would require writing a machine language program to do several different tasks.

The ROM pack is located at $C000. When you turn on your CoCo with the ROM pack inserted, the microprocessor automatically jumps to that address to run a machine language program.

The first part of your ML program would have to move the BASIC program in ROM down to its normal address of $600, then you would have to jump to the proper place in the command loop to initiate the `RUN` command.

This is not the case with compiled BASIC programs. Compiled programs are converted into machine code by the compiling process. Assuming the compiler generates position-independent code, such as BASIC09, you can then run the BASIC program directly from ROM.

One drawback: OS-9 has to be in ROM, also. Since "Catch 22" is becoming old hat, we'll call this one "Catch 09."

ENCORE LISTING

- *In the October 1984 issue of* RAINBOW, *a question came up in "Downloads" — "Not Recognizing All The Characters." It referred back to a listing in "Downloads," March 1984, named* ROMRAM. *I cannot get the listing (I was not subscribing at that time) and I don't really need the whole magazine. I was wondering if you could send me a listing of it.*

Thank you and keep up the excellent work in THE RAINBOW.

Mark Clements
Woodbridge, VA

We'll do better than that Mark, we'll send it to everyone. We receive a lot of requests for this program, and realizing that we have quite a few new readers, it's worth running it again.

```
10 'ROMRAM
20 CLEAR 999
30 DATA 26,80,190,128,0,183,255,
   222,166,128
40 DATA 183,255,223,167,31,140,
   224,0,37,241,57
50 FOR I=1TO21:READA$:A$=A$+CHR$
   (A):NEXT I
60 P=VARPTR(A$)+1
70 POKE P,126
80 EXEC P
90 PRINT"BASIC IS NOW IN RAM"
```

For those of you who have never seen this program, it enables the 64K RAM mode in your CoCo.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity.

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PERSONABLE PASCAL

Graphic-ing With Pascal

By Daniel Adams Eastham
Rainbow Contributing Editor

With spring here and having given the PASCAL language a once-over, I decided it's time to have some fun. While there is no graphics capability defined in the PASCAL language, and most implementations do not include any extensions for graphics, *DEFT Pascal* can be extended to include graphics with the addition of the *DEFT Extra* package. This month, we're going to use these extensions to write a program that runs a graphically generated analog clock.

Graphics Modes

The Color Computer contains several different graphics modes. It has an Alphanumeric Internal mode (which also supports the Semigraphics-4 mode) as well as four additional semigraphics modes and eight graphics modes. All of these modes are defined in the back of the *Getting Started with Color BASIC* manual that came with your Color Computer.

The graphics capabilities in Extended BASIC use the five highest resolution graphics modes as its five PMODEs. The PASCAL graphics extensions use all eight graphics modes. The predefined type GMode identifies the graphics mode:

```
TYPE GMode = (G1C, G1R, G2C, G2R, G3C, G3R, G6C, G6R);
```

(Daniel Eastham holds a B.S. in computer science and has 14 years experience in systems and communications programming, including work on the original Telenet packet switching network. He is the author of the DEFT Pascal Workbench *and* DEFT Extra, *and is currently president of Deft Systems, Inc.)*

The number indicates the number of 'K' (1024 bytes) of memory each graphics mode requires (except for G2R which uses 1.5K), and the trailing letter indicates whether it is a Resolution or Color mode. The resolution modes are all two-color modes and the color modes are all four-color modes.

Regardless of which of the graphics modes you are in, you are always working in a 256 (horizontal) by 192 (vertical) coordinate system. The graphics package maps this coordinate system onto the actual pixels present in the given graphics mode. The graphics mode selected merely identifies the actual resolution of the picture and the amount of memory required.

Colors

The colors available for use in the graphics modes are identified by the predefined type GColor:

```
TYPE  GColor = (GGreen, GYellow, GBlue, GRed,
                GBuff, GCyan, GMagenta, GOrange);

CONST GHiResBlack = GGreen;
      GHiResGreen = GYellow;
      GHiResBuff  = GHiResGreen;
```

The first four colors are the primary colors that are available in the color modes. The second four colors are the alternates for the first four colors. The GHiRes colors are the colors available in the resolution modes. GHiResGreen is the primary color and GHiResBuff is the alternate color.

Control Block and Buffer Area

In order to set up a graphics screen, we need two things:

a control block that contains all the parameters of the screen and a buffer area in which the actual bitmap resides. The predefined type GBlock defines the required control block:

```
TYPE GBlock = RECORD
                Mode     : GMode;
                Address  : Integer;
                AltColor: Boolean;
                Table    : GDataPtr;
                Draw     : RECORD
                  X, Y     : Integer;
                  Color    : GColor;
                  Angle    : 0..7;
                  Scale    : 1..127;
                  END;
                END;
```

Normally, you don't need to use the information contained in a graphics control block since it is automatically initialized and updated by the built-in procedures in the package. The Mode is the graphics mode to use, Address is the memory address of the bitmap buffer, AltColor is a Boolean flag that indicates whether the alternate color set is being used and Table is a pointer to a set of parameters for this particular Mode. The fields in the Draw subrecord contain the current state of DRAW operations.

Initializing

The procedure GInit is used to initialize a control block and bitmap buffer. Its declaration is:

```
PROCEDURE GInit (VAR GraphBlock : GBlock;
                     GraphMode  : GMode;
                     GraphPage  : Integer;
                     AltColor   : Boolean;
                     Background : GColor;
                     DrawColor  : GColor);
```

This procedure initializes GraphBlock using the information provided in the remaining parameters and clears the specified bitmap buffer to the specified Background color.

The GraphPage is a number from zero to 127 indicating which 512-byte boundary on which the bitmap buffer is to begin. Rather than having a fixed number of 1.5K graphics pages as in Extended BASIC, you can put the bitmap buffer on any 512-byte boundary in memory.

When selecting an area for this buffer, you must be careful that you do not overlay your program, the heap (which immediately follows your program and grows up) or the stack (which starts at the top of memory and grows down).

Displaying

While the GInit procedure initializes the bitmap buffer, it does not actually

The listing: *CLOCK*

```
00 0000    (****************************************************************
00 0000    *
00 0000    *    DEFT Systems EXTRA Package for the
00 0000    *    DEFT Pascal Workbench
00 0000    *    INTERFACE Block
00 0000    *    Copyright (c) 1985, Deft Systems, Inc.
00 0000    *
00 0000    ****************************************************************)
00 0000
00 0000    INTERFACE EXTRA;
00 0000
00 0000    TYPE  GMode = (G1C, G1R, G2C, G2R, G3C, G3R, G6C, G6R);
00 0000          GColor = (GGreen, GYellow, GBlue, GRed,
00 0000                   GBuff, GCyan, GMagenta, GOrange);
00 0000
00 0000    CONST GHiResBlack = GGreen;
00 0000          GHiResGreen = GYellow;
00 0000          GHiResBuff  = GHiResGreen;
00 0000
00 0000    TYPE  GData = RECORD
00 0000                    RowShift    : 2..3;
00 0000                    PageCount   : 2..12;
00 0000                    XDivisor    : 1..4;
00 0000                    YDivisor    : 1..3;
00 0000                    YShiftCount : 6..8;
00 0000                    XResolution : 64..256;
00 0000                    YResolution : 64..192;
00 0000                  END;
00 0000          GDataPtr = ^GData;
00 0000
00 0000          GBlock = RECORD
00 0000                     Mode       : GMode;
00 0000                     Address    : Integer;
00 0000                     AltColor   : Boolean;
00 0000
00 0000    FUNCTION Random (VAR Seed : Integer) : Real;
00 0000
00 0000    FUNCTION IRandom (VAR Seed : Integer) : Integer;
00 0000
00 0000    TYPE SectorData = ARRAY[0..255] OF Char;
00 0000
00 0000         DirectData = RECORD
00 0000                        FirstGranule : Integer;
00 0000                        GranuleTable : SectorData;
00 0000                        END;
00 0000
00 0000    FUNCTION ReadSector (Drive, Track, Sector : Integer;
10 0000                         VAR Data : SectorData) : Boolean;
00 0000
00 0000    FUNCTION WriteSector (Drive, Track, Sector : Integer;
10 0000                         VAR Data : SectorData) : Boolean;
00 0000
00 0000    FUNCTION AppendFile (VAR Disk : Text;
10 0000                         VAR Table : DirectData) : Boolean;
00 0000
00 0000    FUNCTION PositionFile (VAR Disk : Text;
10 0000                           VAR Table: DirectData;
10 0000                           RecNumber: Integer) : Boolean;
00 0000
00 0000    FUNCTION AppendFile (VAR Disk : Text;
10 0000                         VAR Table : DirectData) : Boolean;
00 0000
00 0000    FUNCTION UpdateFile (VAR Disk : Text) : Boolean;
00 0000
00 0000    END;

00 0000    (*************************************************
00 0000    *
00 0000    *    Program to run a clock
00 0000    *
00 0000    *    Enter the current hour, minute and second
00 0000    *    when you are prompted.  A running clock
00 0000    *    will then be displayed.
00 0000    *
00 0000    *    In order to compile this program you will
00 0000    *    need DEFT Extra.
00 0000    *
00 0000    *************************************************)
00 0000
00 0000    PROGRAM Clock (Input, Output);
00 0000
00 0000    CONST One30thPi = 0.1047197551;
```

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cause the specified area to be displayed in the indicated graphics mode. To do that you use the GDisplay routine:

```
PROCEDURE GDisplay (VAR GraphBlock:Block);
```

By keeping the operations on a particular graphics area separate from its display, you can have multiple bitmap buffers and display one while you are updating others. This is an absolute requirement in almost any type of animation.

Graphics Operations

After using GInit to initialize a control block and bitmap, you can use the routines GSet, GPoint, GCls, GLine, GBox, GCircle, GPaint and GDraw to perform any required graphics operations. These routines work very similarly to those found in Extended BASIC and their declarations can be found in the Interface block at the beginning of the *Clock* program.

The *Clock* Program

In this program, we are going to use the G6C mode for our clock. This will give us four colors, an actual resolution of 128 by 192 and a memory requirement of 6K for the bitmap buffer. Actually, we are going to use three bitmap buffers, giving a total memory requirement of 18K. We will position our program at 5000 (decimal) and the three bitmap buffers at 32768 ($8000). This will leave plenty of room for the heap below and the stack above.

At the beginning of the program listing you can see the EXTRA Interface block with the declarations of all the constants, types, procedures and functions that we will need. After the interface block is the main program. Here we have declared a number of items.

The One30thPi constant is the distance in radians between minutes on a clock face. We will use this in computing X,Y coordinates of each minute position on the clock face. The TimerLoc constant identifies the address of the disk drive motor timer location. Anytime you put a non-zero value in this location, it will be decremented by one every 1/60th of a second until it is again zero.

Coordinates is a set of 'X' or 'Y' values for the minute positions of the clock. ScreenData (and its associated pointer ScreenDataP) is a 6K type we are going to use in copying one bitmap buffer to another.

```
00 0009        TimerLoc = $985;
00 0009
00 0009   TYPE Coordinates = ARRAY[0..60] OF Integer;
00 0009        ScreenData  = RECORD
00 0009                        Buffer : ARRAY[0..6143] OF Char;
00 0009                      END;
00 0009        ScreenDataP = ^ScreenData;
00 0009
00 0009   VAR Block : GBlock;
00 0009       Blocks : ARRAY[0..1] OF GBlock;
00 0009       Numbers : ARRAY [0..9] OF STRING (41);
00 0000                    Table      : GDataPtr;
00 0000                    Draw       : RECORD
00 0000                      X, Y  : Integer;
00 0000                      Color : GColor;
00 0000                      Angle : 0..7;
00 0000                      Scale : 1..127;
00 0000                    END;
00 0000                  END;
00 0000
00 0000   PROCEDURE GInit (VAR GraphBlock : GBlock;
10 0000                        GraphMode  : GMode;
10 0000                        GraphPage  : Integer;
10 0000                        AltColor   : Boolean;
10 0000                        Background : GColor;
10 0000                        DrawColor  : GColor);
00 0000
00 0000   PROCEDURE GCls (VAR GraphBlock : GBlock;
10 0000                       BackGround : GColor);
00 0000
00 0000   PROCEDURE GDisplay (VAR GraphBlock : GBlock);
00 0000
00 0000   PROCEDURE GDisplayText;
00 0000
00 0000   PROCEDURE GSet (VAR GraphBlock : GBlock;
10 0000                 X, Y            : Integer;
10 0000                 PointColor      : GColor);
00 0000
00 0000   FUNCTION GPoint (VAR GraphBlock : GBlock;
10 0000                     X, Y       : Integer) : GColor;
00 0000
00 0000   PROCEDURE GLine (VAR GraphBlock : GBlock;
10 0000                   X1, Y1, X2, Y2 : Integer;
10 0000                   LineColor      : GColor);
00 0000
00 0000   PROCEDURE GBox (VAR GraphBlock : GBlock;
10 0000                 X1, Y1, X2, Y2 : Integer;
10 0000                 BoxColor       : GColor;
10 0000                 Solid          : Boolean);
00 0000
00 0000   PROCEDURE GCircle (VAR GraphBlock    : GBlock;
10 0000                        X, Y          : Integer;
10 0000                        Radius        : Integer;
10 0000                        Color         : GColor;
10 0000                        Ratio         : Integer;
10 0000                        Start, Finish : Integer);
00 0000
00 0000   FUNCTION GPaint (VAR GraphBlock  : GBlock;
10 0000                      X, Y        : Integer;
10 0000                      PaintColor  : GColor;
10 0000                      BorderColor : GColor) : Boolean;
00 0000
00 0000   PROCEDURE GDraw (VAR GraphBlock : GBlock;
10 0000                  VAR Directions : String);
00 0000
00 0000   PROCEDURE Sound (Frequency, Duration, Volume : Integer);
00 0000
00 0000   FUNCTION JoyStick (Select : Integer) : Integer;
00 0000
00 0000   FUNCTION JoyFire (Select : Integer) : Boolean;
00 0009       I, J : Integer;
00 0009       Hours, Minutes, Seconds : Integer;
00 0009
00 0009       BigX, BigY,
00 0009       MediumX, MediumY,
00 0009       LittleX, LittleY,
00 0009       TinyX, TinyY : Coordinates;
00 0009
00 0009       Angle, AngleSin : Real;
00 0009       Ok : Boolean;
00 0009       Screen : ScreenDataP;
00 0009       Screens : ARRAY[0..1] OF ScreenDataP;
00 0009   (*************************************************
00 0009   *
```

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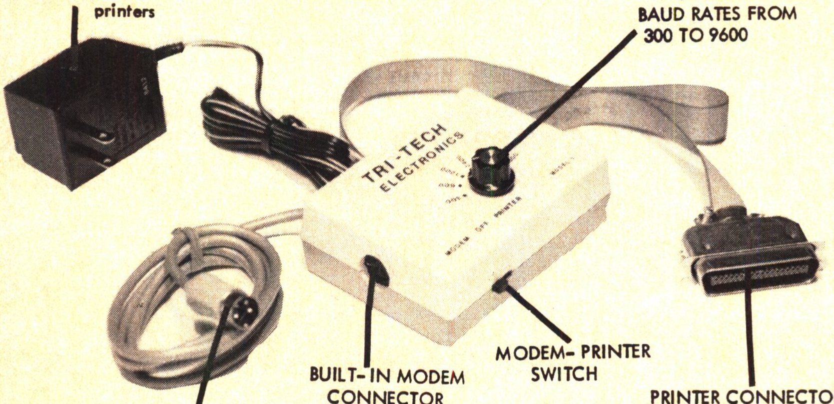

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Block is a graphics control block where we are going to initially build the clock face without hands. Blocks is a two-element array of graphics control blocks which contain the currently displayed and about to be displayed clock faces with hands. Screen and Screens are pointers to the bitmap buffers of the corresponding Block and Blocks.

Numbers is an array of strings which contains the GDraw vectors for drawing each number. BigX, BigY are the outside coordinates used for the hour marks. MediumX, MediumY are the coordinates used for the minute and second hands as well as the inside of the hour marks. LittleX, LittleY are the coordinates for the hour hand. TinyX, TinyY are the coordinates used to build the "back end" of the hour and minute hands.

Main Program Flow

Going down to the main program we see the message to wait "one moment please," followed by 10 assignment statements. These statements assign the GDraw strings to draw the numbers zero through nine to the corresponding elements of the Numbers array.

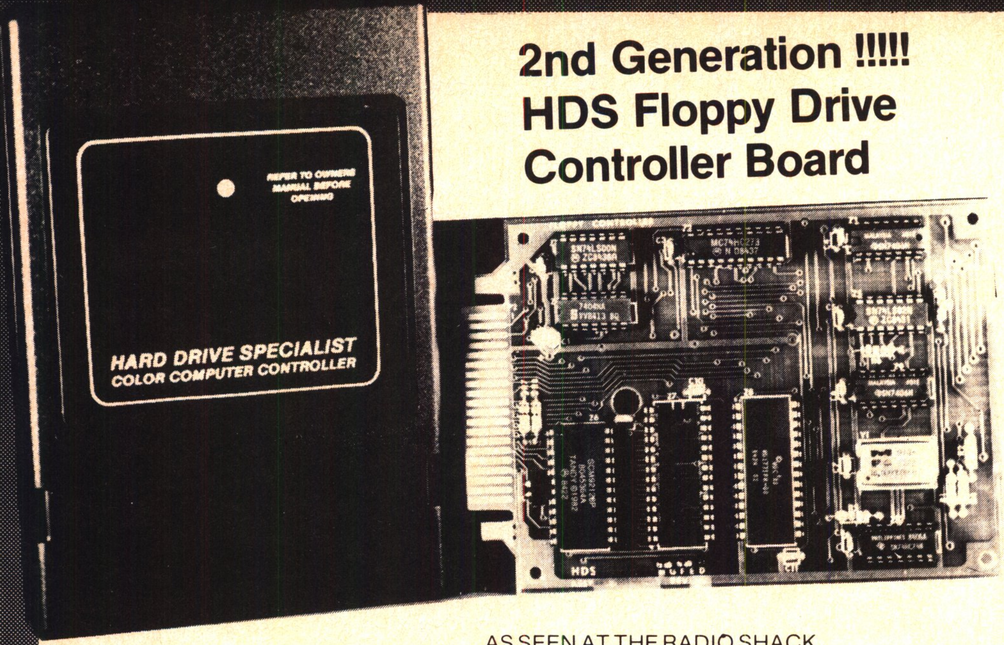
We then initialize all three graphics blocks, bitmaps and screen pointers. The first is at page number 64 (32768 DIV 512) with the other two at 76 and 84. You notice the pointers are initialized by taking the integer Address out of the graphics blocks and converting it to a pointer via the built-in PTR function.

The next loop computes the X,Y coordinates of the minute positions of the clock face at four different distances from the center of the clock. The procedure ComputeXY is used to actually fill in the coordinate arrays. Rather than repeat the loop 60 times, it is only necessary to do it 15 times since all four quadrants can be computed at once. Actually, 16 iterations are made with some duplication in order to get all 60 positions.

After computing the X,Y coordinates, the next loop draws the blank clock face (without hands). This face is drawn using Block and will be the base from which we will work. You notice that the X,Y draw position can be changed not only with standard GDraw vectors, but also by directly setting the 'X' and 'Y' fields in the Draw subrecord of Block.

Once the clock face is ready, we

```
00 0009   * Routine to compute X,Y circumference coordinates
00 0009   *
00 0009   ************************************************)
00 0009
00 0009   PROCEDURE ComputeXY (Radius : Real; VAR X, Y : Coordinates);
10 0009
10 0009   VAR Fraction : Integer;
10 0009
10 0009   BEGIN
11 000F     Fraction := Round (AngleSin * Radius);
11 0033     X[I] := 128 + Fraction;
11 0053     X[30-I] := 128 + Fraction;
11 0080     X[30+I] := 128 - Fraction;
11 00AD     X[60-I] := 128 - Fraction;
11 00E0
11 00E0     Fraction := Fraction * 7 DIV 8;
11 00FC     Y[15-I] := 96 - Fraction;
11 012F     Y[15+I] := 96 + Fraction;
11 0156     Y[45-I] := 96 + Fraction;
11 0183     Y[45+I] := 96 - Fraction;
11 01B0   END;
00 01B4   (************************************************
00 01B4   *
00 01B4   * Routine to display a clock hand
00 01B4   *
00 01B4   ************************************************)
00 01B4
00 01B4   PROCEDURE DisplayHand (Value : Integer;
10 01B4                          Color : GColor;
10 01B4                          VAR X,Y : Coordinates);
10 01B4
10 01B4   VAR Right, Left : Integer;
10 01B4
10 01B4   BEGIN
11 01BA     Right := (Value + 20) MOD 60;
11 01D3     Left := (Value + 40) MOD 60;
11 01EC     GLine (Blocks[I], X[Value], Y[Value],
11 0219            TinyX[Right], TinyY[Right], Color);
11 0245     GLine (Blocks[I], X[Value], Y[Value],
11 0272            TinyX[Left], TinyY[Left], Color);
11 029E     GLine (Blocks[I], TinyX[Right], TinyY[Right],
11 02D1            TinyX[Left], TinyY[Left], Color);
11 02FD     Ok := GPaint (Blocks[I], 128, 96, Color, Color);
11 033D     GLine (Blocks[I], 128, 96, X[Value], Y[Value], Color);
11 0382   END;
00 0386   (************************************************
00 0386   *
00 0386   * Main entry for clock program
00 0386   *
00 0386   ************************************************)
00 0386
00 0386   BEGIN
01 038E     Page;
01 039A     Cursor (256);
01 03A6     WRITE ('ONE MOMENT PLEASE');
01 03C8
01 03C8     Numbers[0] := 'BR4R4F2D8G2L4H2U8E2BR8';
01 03FA     Numbers[1] := 'BF2E2D12L2R4BU12BR2';
01 042A     Numbers[2] := 'BF2E2R4F2D2G2L4G2D4R8BU12BR2';
01 0463     Numbers[3] := 'BF2E2R4F2D2G2NL2F2D2G2L4H2BR10BU10';
01 04A2     Numbers[4] := 'BD6BR2E6D12U6L6R8BU4BR2';
01 04D6     Numbers[5] := 'BR2NR8D4R6F2D4G2L4H2BR10BU10';
01 050F     Numbers[6] := 'BR4NR4G2D8F2R4E2U2H2L6BR10BU6';
01 0549     Numbers[7] := 'BR2R8G8D4BR10BU12';
01 0577     Numbers[8] := 'BF2E2R4F2D2G2NL4F2D2G2L4H2U2E2H2U2BU2BR10';
01 05BD     Numbers[9] := 'BF2E2R4F2D2G2NL4F2D2G2L4BU6H2U2BU2BR10';
01 0600
01 0600     GInit (Block, G6C, 64, False, GBlue, GYellow);
01 0624     Screen := PTR (Block.Address);
01 062A
01 062A     FOR I := 0 TO 1 DO BEGIN
02 0640       GInit (Blocks[I], G6C, 76+I*12, False, GBlue, GYellow);
02 0686       Screens[I] := PTR (Blocks[I].Address);
02 06AF       END;
01 06BF
01 06BF     Angle := 0.0;
01 06D3     FOR I := 0 TO 15 DO BEGIN
02 06E9       AngleSin := SIN (Angle);
02 0706       ComputeXY (88.0, BigX, BigY);
02 0724       ComputeXY (80.0, MediumX, MediumY);
02 0742       ComputeXY (60.0, LittleX, LittleY);
02 0760       ComputeXY (8.0, TinyX, TinyY);
02 077E       Angle := Angle + One30thPi;
02 079C       WRITE ('.');
```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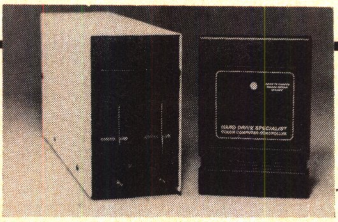

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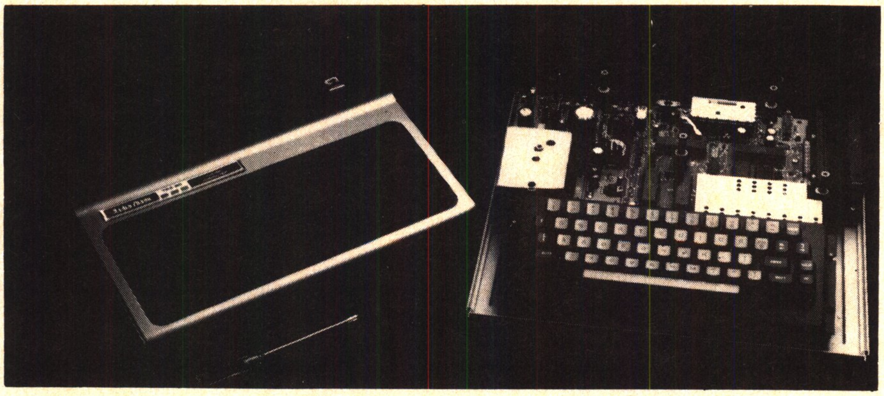

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prompt the user for the current time. We now set up for the main timing loop by initializing the timer location value to 255 to start the timer running. The variable will be used to select one of the two Blocks for update and display.

In the loop, we compute the next value for Hours, Minutes and Seconds, then select the opposite Blocks from the last loop iteration by setting 'I' to either '0' or '1.' We then copy in a blank clock face and draw the minute, second and hour hands (in that order). The second hand is just a line from the middle of the clock to the edge. The hour and minute hands are drawn in outline and painted in by the procedure DisplayHand.

After everything is ready, we wait until a total of 59/60ths of a second have elapsed (255 – 59 = 196). GDisplay then waits another 1/60th of a second before actually displaying the current screen.

We then immedately add 60 back to the interrupt driven count. By adding back rather than setting to an absolute value, we may be able to catch up any lost time on a succeeding second. This is because painting the hour and minute hands will take a variable amount of time, depending on their positions.

Finally, Sound is used to give our clock a tick.

If you have any questions about using *DEFT Extra*, you can call me at (301) 253-1300 during normal business hours (Eastern Standard Time) for help.

Prior to loading the following program, these commands are needed:

```
PCLEAR 1
FILES0,0
CLEAR16,4999
```

```
02 07B0        END;
01 07C0
01 07C0      GCircle (Block, 128, 96, 84, GYellow, 224, 0, 0);
01 07EE      FOR J := 1 TO 5 DO BEGIN
02 0805        I := J * 5;
02 0817        Block.Draw.X := BigX[I] + 6;
02 082C        Block.Draw.Y := BigY[I] - 6;
02 0847        GDraw (Block, Numbers[J]);
02 0869        Block.Draw.X := BigX[I+30] - 14;
02 088B        Block.Draw.Y := BigY[I+30] - 6;
02 08AD        IF J > 3 THEN BEGIN
03 08BD          Block.Draw.X := BiGX[I+30] - 24;
03 08DF          GDraw (Block, Numbers[1]);
03 0900          GDraw (Block, Numbers[J-4]);
03 092F          END
02 092F        ELSE GDraw (Block, Numbers[J+6]);
02 095B        END;
01 096B
01 096B      GDraw (Block, 'BM118,5');
01 0981      GDraw (Block, Numbers[1]);
01 09A2      GDraw (Block, Numbers[2]);
01 09C3      GDraw (Block, 'BM122,177');
01 09DB      GDraw (BLock, Numbers[6]);
01 09FC      FOR J := 1 TO 12 DO BEGIN
02 0A13        I := J * 5;
02 0A25        GLine (Block, MediumX[I], MediumY[I], BigX[I], BigY[I], GYellow);
02 0A6E        END;
01 0A7D
01 0A7D      Page;
01 0A89      Cursor (256);
01 0A95      WRITE ('ENTER TIME (HH,MM,SS): ');
01 0ABD      READLN (Hours, Minutes, Seconds);
01 0AEF      Hours := Hours MOD 12;
01 0B05      Minutes := Minutes MOD 60;
01 0B1B
01 0B1B      I := 0;
01 0B21      BYTE[TimerLoc] := 255;
01 0B2B      WHILE TRUE DO BEGIN
02 0B33        Seconds := Seconds +.1;
02 0B42        IF Seconds >= 60 THEN BEGIN
03 0B52          Seconds := 0;
03 0B58          Minutes := Minutes + 1;
03 0B67          IF Minutes = 60 THEN BEGIN
04 0B77            Minutes := 0;
04 0B7D            Hours := Hours + 1;
04 0B8C            IF Hours = 12 THEN Hours := 0;
04 0BA2            END;
03 0BA2          END;
02 0BA2
02 0BA2        I := 1 - I;
02 0BB7        ScreenS[I]^ := Screen^;
02 0BD7        DisplayHand (Minutes, GRed, MediumX, MediumY);
02 0BF5        GLine (Blocks[I], MediumX[Seconds], MediumY[Seconds],
02 0C24                          128, 96, GYellow);
02 0C3C        DisplayHand (Minutes DIV 12 + Hours*5, GGreen, LittleX, LittleY);
02 0C75
02 0C75        WHILE BYTE[TimerLoc] > 196 DO;
02 0C8B        GDisplay (Blocks[I]);
02 0CA7        BYTE[TimerLoc] := BYTE[TimerLoc] + 60;
02 0CBD        Sound (150, 1, 31);
02 0CD3        END;
01 0CD6    END.
```

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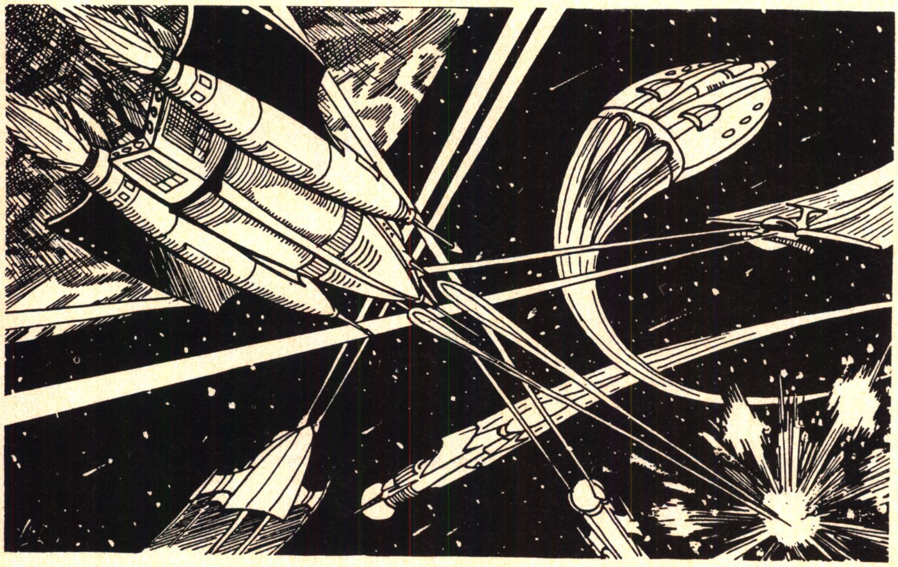

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OS-9 UTILITY

This program helps end disk confusion and overcome limited directory listings by displaying a complete directory of the disk

Hierarchal Directory

By Donald L. McGarry

One of the most convenient features of Microware's OS-9 operating system is its hierarchal directory structure. With a disk full of programs in Extended BASIC, a directory listing flies by on the screen. Pausing the display with SHIFT-@ is a test of reflexes as well as patience.

OS-9, on the other hand, allows many separate directories so each one contains only related files. I often have several levels of directories on one disk.

This is a fine method of file storage and I wonder how I ever lived without it, but it also has its problems. I often forget which file is which directory on a disk. Worse, I sometimes forget which disk holds the particular file I'm looking for.

The problem is compounded for those of us who keep several backup copies of important files on different disks. If one of these files is modified and the others are not immediately updated, the newest version is often difficult to identify.

Finally, "dir," as supplied by Radio Shack for the Color Computer, displays

(Don McGarry holds a bachelor's degree in physics, a master's degree in applied sciences, and is currently teaching high school physics. He pioneered the adult education BASIC programming curriculum in the Northport, N.Y., school system and has taught programming to all age levels.)

The listing:

```
PROCEDURE HDirect

(* Prints an indented, hierarchal directory of /d0 or /d1
(* to the printer or the screen
(* Returns with working directory set to
(* 'root directory' of /d0 or /d1
(* whichever was used for the directory
(* D. McGarry

(* Calls: Direct and FixDate

PRINT CHR$(2) \REM Clear the screen

DIM Response:STRING[1]
DIM OutPath,DPath,Char:BYTE
DIM Level,Lines:INTEGER
DIM Date(5):BYTE
DIM SDate:STRING[14]

PRINT " Directory of which drive (0*/1) ";
GET #0,Response
PRINT  \ PRINT
IF Response=CHR$(13) THEN
Response="0"
ENDIF
IF Response<"0" OR Response>"1" THEN
END
ENDIF
CHD "/d"+Response \REM Point to the correct drive

PRINT " Print to Screen or Printer (S*/P) ";
GET #0,Response
PRINT
IF Response=CHR$(13) OR Response="s" THEN
Response="S"
ELSE IF Response="p" THEN
Response="P"
ENDIF
```

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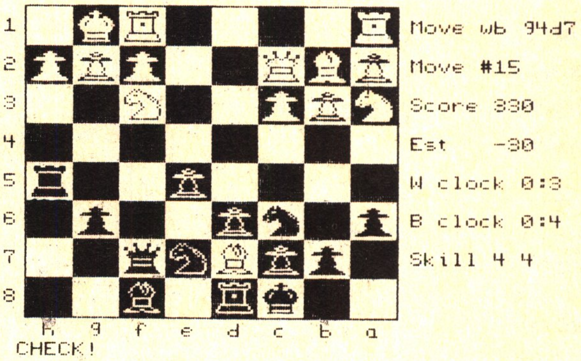

```
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Move #15
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Est    -30
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B clock 0:4
Skill 4 4
CHECK!
```

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a directory which wraps around two screen lines to display one line of information. Redirecting output to the printer just produces a hard copy of the narrow display.

What I needed to end most of the disk confusion and to overcome the limited directory listings was a program that would display or print a complete directory for a disk. *HDirect* does just that!

In addition to displaying a complete directory, the programs display the date the file was last modified and the size of the file. Other pieces of information such as file attributes, creation date, owner's ID and link count could be added easily (I left them out because I have no use for them). Details of the file descriptor sector which contains this information is given on pages 35 and 36 of the OS-9 Technical Information Manual supplied with OS-9.

The output of the programs is an indented, hierarchal directory starting with the root directory. Each level is indented from the previous level so that a disk's structure is easy to see. The programs are relatively straightforward, but they do make use of some interesting techniques. I will describe them briefly.

> ***" . . . if a variable name is misspelled in the program, the listing will show the name in lowercase. This acts as an instant spelling checker during program development."***

Names of variables are capitalized for a reason. If a variable is entered for the first time with a capital letter in its name, BASIC09 will change all future references to that variable to the original capitalization. Thus, if a variable name is misspelled in the program, the listing will show the name in lowercase. This acts as an instant spelling checker during program development.

Most of *HDirect* is self-explanatory, but a trick is used to read the disk name. The entire disk can be read as a single random access file if the filename used in the OPEN statement is '@.' Using this technique allows *HDirect* to get the disk name and creation date.

The same method is used in *Direct* to get the file descriptor information

```
ENDIF
IF Response<>"P" AND Response<>"S" THEN
END
ENDIF
IF Response="P" THEN
CLOSE #1 \REM Close standard output path
OPEN #OutPath,"/P":WRITE \REM and substitute printer
ENDIF

PRINT  \ PRINT
REM Get disk name
OPEN #DPath,"@":READ
SEEK #DPath,31
LOOP
GET #DPath,Char
EXITIF Char>127 THEN
PRINT CHR$(Char-128); "      ";
ENDEXIT
PRINT CHR$(Char);
ENDLOOP

PRINT "Created  ";
REM Get disk creation date
SEEK #DPath,26
GET #DPath,Date
RUN FixDate(Date,SDate)
PRINT SDate;

REM Change the next line for a narrower screen
PRINT TAB(57); "Last Modified      Size"
CLOSE #DPath
PRINT  \ PRINT

Level=0
Lines=4
RUN Direct(Level,Lines)
PRINT
REM Restore correct standard output path
CLOSE #1
OPEN #OutPath,"/Term":WRITE

END
PROCEDURE Direct

(* Reads, formats, and prints file descriptor information
(* from the default drive and changes directories
(* D. McGarry

(* Calls: Direct

TYPE Descriptor=Attr,Owner(2),MDate(5),LCount,FSize(4):BYTE

PARAM Level,Lines:INTEGER

DIM Name:STRING[29]
DIM Temp:STRING[24]
DIM I:INTEGER
DIM DPath,Path,LSN(3):BYTE
DIM FileInfo:Descriptor
DIM Sector,TSize:REAL

OPEN #Path,".":READ+DIR
REM Skip "." and ".."
GET #Path,Name
GET #Path,LSN
GET #Path,Name
GET #Path,LSN

WHILE NOT(EOF(#Path)) DO
```

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of each entry. If a printed listing is chosen, the standard output path is closed and the printer is substituted. Be careful closing and opening any of the standard paths — a mistake can create a mess.

HDirect prints a heading, sets two variables and calls *Direct*, which does all of the real work. *Direct* reads each file in a directory. It prints the name and checks the descriptor to see if the file is a directory. If it is, the variable level is incremented and *Direct* calls itself. Each call to *Direct* ends when it has read all of the files in a directory.

Since all disks begin with a root directory, the sequence of calls to *Direct* begins and ends at the root of the disk being read. Changes to *Direct* will allow the addition of the file information mentioned above.

The other program, *FixDate*, just converts a date from the format used by OS-9 to a string. I prefer month/day/year format to OS-9's year/month/day format, so I changed the order also. You could keep the original date order by removing the lines in *FixDate* which change Date(1), Date(2) and Date(3).

The programs were designed for an 80-character line. If your screen display is not that wide, *HDirect* and *Direct* should probably be changed to fit your screen. Change the lines containing "PRINT TAB(57)" and "PRINT TAB(56)". Keep a full-width version of the programs for printing.

When you enter the programs, enter *HDirect* first. This way when the programs are packed, they will work correctly. Don't forget to save the programs before you pack them.

If you have more than two disk drives, you can change the drive number response in *HDirect* to the number of drives you have.

Using *HDirect* is simple. The program prompts for the information it needs. If you pack the programs and want to print directories of several disks, you should load BASIC09 and *HDirect* so they don't have to be reloaded after each disk.

Please remember that *HDirect* will leave you logged onto the root directory of the disk that it accessed when it is finished. If your working directory was somewhere else, you will have to log back on using "chd."

(Anyone having questions regarding this program may contact Mr. McGarry at 2 Heather Dr., Northport, NY 11768, phone (516) 754-3069.)

```
GET #Path,Name
GET #Path,LSN
Sector=65536.*LSN(1)+256*LSN(2)+LSN(3)

REM Change Name into BASIC09 format
FOR I=1 TO 29
EXITIF MID$(Name,I,1)>CHR$(127) THEN
Name=LEFT$(Name,I-1)+CHR$(ASC(MID$(Name,I,1))-128)
ENDEXIT
NEXT I

OPEN #DPath,"@":READ
SEEK #DPath,Sector*256
GET #DPath,FileInfo
CLOSE #DPath

IF ASC(Name)<>0 THEN
TSize=256*256*256*FileInfo.FSize(1)+256*256*FileInfo.FSize(2)+256

*FileInfo.FSize(3)+FileInfo.FSize(4)
 RUN FixDate(FileInfo.MDate,Temp)
 Temp=LEFT$(Temp,14)+RIGHT$("           "+STR$(TSize),11)
 PRINT TAB(4*Level+1); Name;
 PRINT TAB(56); Temp \REM Change for narrower screen

 Lines=Lines+1
 IF Lines=60 THEN
 FOR I=1 TO 6
 PRINT
 NEXT I
 Lines=0
 ENDIF

 IF FileInfo.Attr>127 THEN CHD Name
 RUN Direct(Level+1,Lines)
 CHD ".."
 ENDIF

 ENDIF

 ENDWHILE

 CLOSE #Path

 END
 PROCEDURE FixDate

 (* Changes a five byte date into a 14 character string
 (* with the date in the format: MM/DD/YY HH:MM
 (* D. McGarry

 PARAM Date(5):BYTE
 PARAM SDate:STRING[14]

 DIM Temp:BYTE
 DIM I:INTEGER

 SDate=""

 REM remove the next 4 lines to keep date in YY/MM/DD format
 Temp=Date(1)
 Date(1)=Date(2)
 Date(2)=Date(3)
 Date(3)=Temp

 FOR I=1 TO 5
 SDate=SDate+RIGHT$("0"+STR$(Date(I)),2)+MID$("// : ",I,1)
 NEXT I
 END
```

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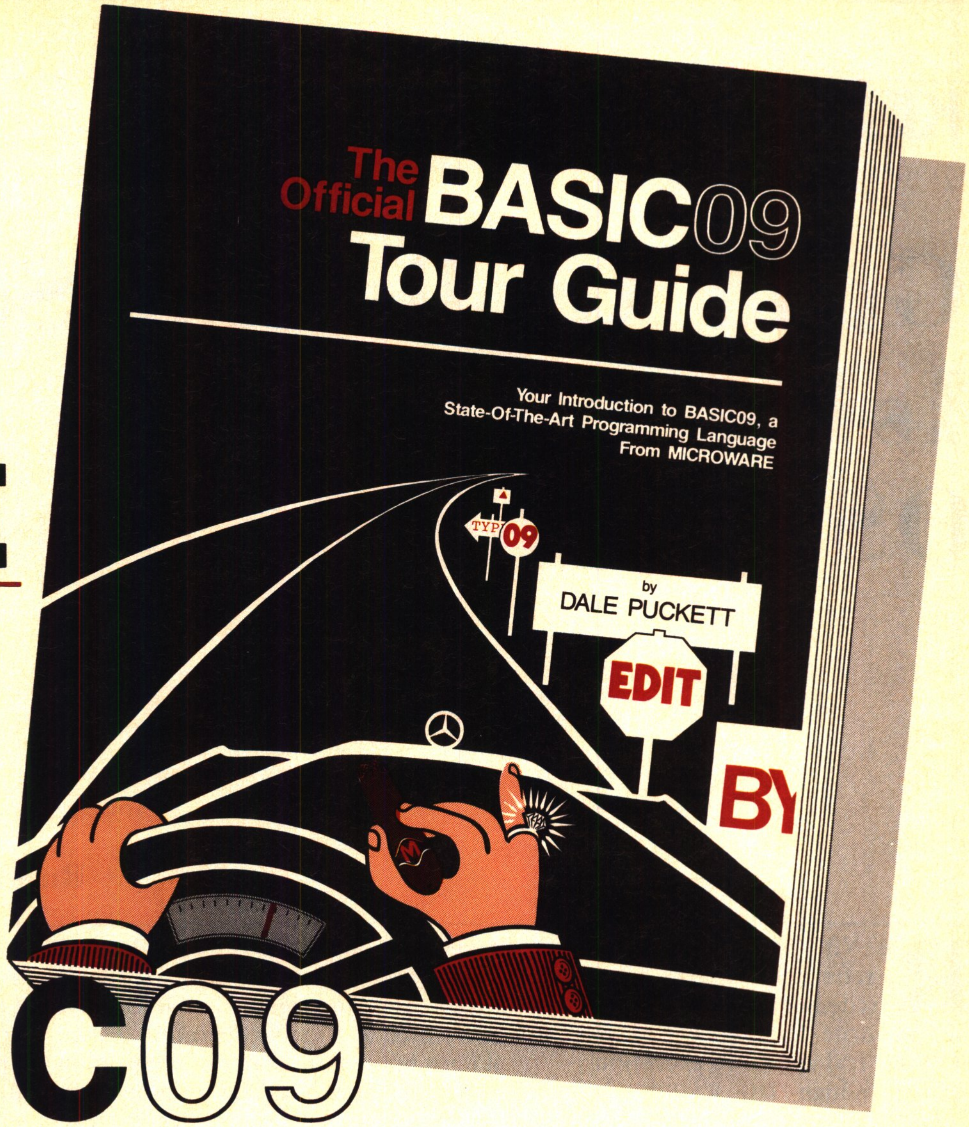
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KISSable OS-9

Good Application Software Is Essential To OS-9's Health . . .

By Dale L. Puckett
Rainbow Contributing Editor

RAINBOWfests give CoCo users a refreshing weekend filled with excitement and enthusiasm for their favorite computer, and RAINBOWfest Irvine was no exception.

Even though THE RAINBOW's new *Guide to OS-9* didn't make it off the press in time, the crowd was full of OS-9 supporters and attendance was overwhelming for our seminar Saturday morning. Another large group showed up for the BASIC09 seminar on Sunday. In addition to these seminars, OS-9 enthusiasts got a chance to hear Ken Kaplan, president of Microware Systems Corporation and father of their operating system, at the CoCo Community Breakfast on Saturday.

(See "RAINBOWfest Reporter" on Page 85 for a complete report on Kaplan's remarks.)

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He is the author of The Official BASIC09 Tour Guide, *published by Microware, and* The Official Rainbow Guide to OS-9, *published through the Rainbow Bookshelf. He serves on the InfoWorld Software Review Board and is a chief warrant officer in the U.S. Coast Guard.)*

Sugar Software Offers OS-9 Application

During the past several years, I have stated time and again that if OS-9 is to succeed as a viable operating system it must boast a fine stable of application programs. Sure, it's great for us hackers to modify and learn UNIX-like systems, but on the bottom line — if OS-9 is ever going to become a salable commercial system — real people must be able to buy programs that do real work. Many people don't want to learn how to program; they simply want to get a job done faster and more efficiently.

Because of this belief, I have patiently made the rounds in the exhibit hall at the last three or four RAINBOWfests and asked each vendor if he or she was offering, or planned to offer, any software running under OS-9. I finally got the right answer at the Sugar Software (2153 Leah Lane, Reynoldsburg, OH 43068) booth in Irvine.

Gary Davis has written a version of the *CoCo Calligrapher* that runs under OS-9. He used the Color Computer C compiler to develop the program. A UNIX-like CAT utility comes with the *OS-9 Calligrapher*.

Davis' program works like a text processor. It reads ASCII characters from a file that contains text mixed with formatting commands. It converts a standard text file into artistic characters on five different printers. OS-9 Version 1.01.00 is required and you'll need a printer capable of bit-image printing. Epson, Gemini, Tandy DMP, Okidata, Banana and Prowriter printers are supported.

The *Calligrapher* prints your text in 36-point type and, on my Epson printer, I was able to print more characters on a line because the program uses the MX-80's narrow mode. It is an excellent tool for making signs, flyers, invitations, diplomas, awards, certificates and labels. In fact, after I printed a sample file Gary put on the disk and accidentally left it on the dining room table, I learned that my daughter, who has little more than a marginal interest in computers, was impressed. She picked up the printout and started asking all kinds of questions.

Gary's program had communicated with a real person who had a specific job in mind — a school newspaper in this case — and wanted a tool to do the job.

The *OS-9 Calligrapher* comes with Cartoon, Gay Nineties and Old English fonts and you can buy an additional 25 fonts on a separate disk. You'll realize the true beauty of OS-9 when you see how Davis has implemented the

Incredible!*

4 User 68000

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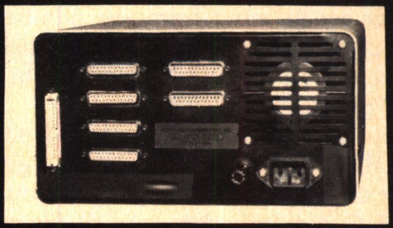

**Terminal not included.

Multi-User!

Frank Hogg Laboratory announces their 'K System' Quad Terminal (QT) series of multi-user computer systems, designed to run Microwares new OS-9/68000 operating system. The QT offers 32 bit processor power in a compact integrated package that requires only a terminal to operate.

The QT hardware features: 68008 processor running at 8 Mhz, 128K bytes expandable to 512K bytes, an interval timer for time sharing, 4 serial ports with selectable baud rates from 300 to 19,200, 2 centronics compatible parallel printer ports. Supports 2 double sided double density 96 tpi floppy disk drives and a SCSI (SASI) bus interface for Winchester disk drives. The QT is available as a single floppy (1), a dual floppy (2) or as a single floppy and a 10 or 20 megabyte hard disk (HD). Size 5 1/2 high, 11 1/2 deep, 9 1/2 wide. Can be mounted vertically or horizontally.

Software Included!

SOFTWARE included is OS-9/68000, the 68000 version of the proven OS-9 operating System that is both disk and file compatible with standard and Color computer versions of OS-9. Basic09 is the 68000 version and is source compatible with the 6809 version. DynaCalc is the 68000 version of the proven 6809 spreadsheet. Stylograph is the 68000 version of the popular 6809 word processor. Mail merge and speller are the 68000 versions of those programs. Programming tools included are a relocating macro assembler with linkage editor, screen and line editors, and an interactive debugger. The software has a retail value in excess of $2000 and is INCLUDED free! Programming languages available and under development include C, Pascal, Fortran and Sculptor.

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program. It is not an interactive program like you would find on an MS BASIC computer. Rather, it is a filter, like most of the programs you use daily with OS-9.

Remember, a filter is a program that reads data from a standard input path, does something to it and sends its result to a standard output path. When you use standard data paths, you can have a filter get its input from any number of sources — your keyboard, a disk file or the piped output from another OS-9 program, for example.

You can also send the output from your filter anywhere you want it to go. For example, you can send it to your Color Computer screen, a disk file or your printer.

If you send the output of the *OS-9 Calligrapher* to the screen, you will see a lot of random gibberish, but if you send it to the printer, you will see it form some nice characters. You can also send it to a disk file and send it (with the Cat command) to the printer later.

The program's directives, or commands, are very similar to the directives you use with most text processors. Additionally, you can specify the directory prefix, the font filename, the amount of indentation, the length of the page, the printer you are using and the width of your paper from the OS-9 command line.

You can also tell the *Calligrapher* what to do when a line is too long and whether you want it to echo the file you are processing on OS-9's standard error path from the command line.

You can get a quick printout of short copy by letting the *Calligrapher* get its input from the keyboard with this command line: calli >/p. Notice that you must always direct the output of the *OS-9 Calligrapher* to a disk file or printer.

After he told me about his new program, I asked Gary Davis if he planned to do more development with OS-9.

"I hope to be able to write some more programs using OS-9 because it is a nice environment to work in," he said. "But, I'll need to look at the bottom line on this product first to see if it's a worthwhile market."

We have a "Catch 22" situation here. Without good application software, very few people will use an operating system. Yet, with the relatively small numbers of people using OS-9 on the Color Computer (compared to Extended BASIC), there are very few software companies that can afford the investment of time and money required to produce and promote products for it.

The answer is to make programs developed on OS-9 usable on all 64K Color Computers. I hope developers are starting to move in that direction.

Rosen Demonstrates his Solution

Bob Rosen at Spectrum Projects is another Color Computer vendor that seems to be taking OS-9 seriously. As we mentioned last month, Bob sent us a special delivery flyer about *The OS-9 Solution* written by Jeff Francis at MegaSoft. Bob brought Jeff to Irvine and together they demonstrated their new program.

The listing:

```
PROCEDURE Uniq09
 0000       DIM file,word,lastword:STRING
 000F       DIM dic:BYTE
 0016
 0017       INPUT "What is the name of the dictonary you would like to check? "            ,file
 005A       OPEN #dic,file:READ
 0066
 0067       lastword:=""
 006E       PRINT "Looking for double words in your list!"
 0098       PRINT
 009A
 009B       WHILE NOT(EOF(#dic)) DO
 00A6         READ #dic,word
 00B0         IF word=lastword THEN
 00BD           PRINT CHR$(7)
 00C2           PRINT word
 00C7         ENDIF
 00C9         lastword:=word
 00D1       ENDWHILE
 00D5
 00D6       PRINT
 00D8       PRINT "file read complete!"
 00EF       CLOSE #dic
 00F5       END
PROCEDURE WordOrder
 0000       DIM file,word,lastword:STRING
 000F       DIM dic:BYTE
 0016
 0017       INPUT "What is the name of the dictionary you would like to check? "           ,file
 005B       OPEN #dic,file:READ
 0067
 0068       lastword:=""
 006F       PRINT "looking for words out of order!"
 0092       PRINT
 0094
 0095       WHILE NOT(EOF(#dic)) DO
 00A0         READ #dic,word
 00AA         IF word<lastword THEN
 00B7           PRINT CHR$(7)
 00BC           PRINT word
 00C1         ENDIF
 00C3         lastword:=word
 00CB       ENDWHILE
 00CF
 00D0       PRINT
```

OS-9™ SOFTWARE

SDISK—Standard disk driver module allows the use of 35, 40, or 80 track double sided drives with COCO OS-9 plus you can read/write/format the OS-9 formats used by other OS-9 systems. **$29.95**

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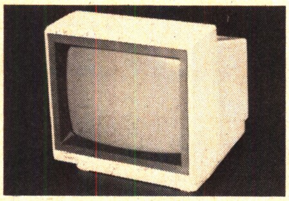

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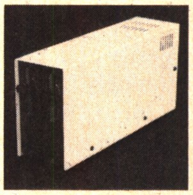

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Francis wrote this program to help make it easier for you to use OS-9 on your Color Computer. *The OS-9 Solution* is a program that lets you select commands from a menu. The program can get its input and output from any device. But, any output device must use Tandy's standard OS-9 cursor-positioning codes.

This means FHL's *O-Pak* will work with it, as will PBJ's new *Word-Pak* OS-9 driver. Unfortunately, the original version of the *Word-Pak* drivers will not work with *The OS-9 Solution.* I hope Jeff will someday plug in the "GoToXY" code needed to support any terminal you may plug into the Color Computer's new ACIA port.

It is easy to install *The OS-9 Solution* on your computer because of the "install" file Rosen plans to ship with the package. In general, you simply boot up your system, take out the Tandy system disk, place your own in the drive and type `/D0/INSTALL`. Since Francis' program takes care of their function, you can remove the Backup, Cmp, Copy, Date, Del, DelDir, Dump, Format, Free, Indent, List, Load, MakDir, Merge, Rename, Setime, Tmode, Verify and XMode commands.

Unfortunately, all of these functions require a lot of memory. This means you can only use it to do file managing tasks. Yet, someday we are bound to see OS-9 Color Computers with more memory; then you will be able to select larger programs like BASIC09 and do a lot more from *The OS-9 Solution*'s menu.

In fact, you can even call the Shell from the program's manual, a feature that will let you escape from *The OS-9 Solution* temporarily to build pipelines and exercise other OS-9 UNIX-like functions.

When you bring *The OS-9 Solution* to life, you'll see a list of commands and a window containing a list of the files stored in your current data directory. You'll also see an arrow pointing to the file in the middle of this window.

To use a command, you type the first letter of its name. For example, the letter 'A' will let you print the contents of your current data directory in alphabetical order. Or, if you wanted to copy a file, you would simply type a 'C' for copy, followed by a 'D' for destination directory. It would then copy the file pointed to by the arrow in the directory window into a file with the same name in the destination directory. Believe me, it's much easier to do it than to put it in words.

```
 00D2       PRINT "All done with this file!"
 00EE       CLOSE #dic
 00F4       END
PROCEDURE Uniq_filter
 0000       DIM file,word,lastword:STRING
 000F       DIM stdin,stdout,stderr:BYTE
 001E       DIM dic:BYTE
 0025
 0026       (* This version of uniq09 works like a filter *)
 0056       (* OS9: list words ! uniq_filter <RETURN> *)
 0082
 0083       stdin:=0
 008A       stdout:=1
 0091       stderr:=2
 0098       lastword:=""
 009F
 00A0       WRITE #stderr,"Looking for double words in your list!"
 00CF
 00D0       ON ERROR GOTO 10
 00D6
 00D7       WHILE NOT(EOF(#stdin)) DO
 00E2         READ #stdin,word
 00EC         IF word=lastword THEN
 00F9           WRITE #stdout,word
 0103         ENDIF
 0105
 0106         lastword:=word
 010E       ENDWHILE
 0112
 0113 10    WRITE #stderr,"file read complete!"
 0132       END
PROCEDURE uniq_remove
 0000       DIM file,word,lastword:STRING
 000F       DIM stdin,stdout,stderr:BYTE
 001E       DIM dic:BYTE
 0025
 0026       (* This version of uniq09 works like a filter *)
 0056       (* OS9: list words ! uniq_filter <RETURN> *)
 0082
 0083       stdin:=0
 008A       stdout:=1
 0091       stderr:=2
 0098       lastword:=""
 009F
 00A0       WRITE #stderr,"Removing double words from your list!"
 00CE
 00CF       ON ERROR GOTO 10
 00D5
 00D6       WHILE NOT(EOF(#stdin)) DO
 00E1         READ #stdin,word
 00EB         IF word<>lastword THEN
 00F8           WRITE #stdout,word
 0102         ENDIF
 0104
 0105         lastword:=word
 010D       ENDWHILE
 0111
 0112 10    WRITE #stderr,"file read complete!"
 0131       END
```

OS-9 Users Group Software Exchange Library

VOLUME	TITLE	LANGUAGE	AUTHOR	DESCRIPTION
0	ATTR_CHG	BASIC09	Waggoner, Roland T.	Allows optional verification of changes before they are made.
0	BOOTSPLIT	BASIC09	Kreider, Carl R.	Splits merged object files (such as OS9Boot) into separate modules.
0	DDIR	assembly	Seaton, W. G.	Lists active system devices, their path descriptor address, physical address, system buffer, device driver and file manager.
0	DLIST	BASIC09	Kreider, Carl R.	Disk dump utility. Works like "DUMP /D0@" except you can start at any sector on the disk.
0	DOCGEN2	BASIC09	Kaleita, David L.	Program you should run when you contribute a program to the OS-9 UG library. It generates a submission form and database files.
0	HCOPY	BASIC09	Snyder, Hal, M.D.	Prompting COPY utility.
0	HDEL	BASIC09	Bergvall, Bengt-Allan	Modified HDEL from Users Group disk #0 to handle empty files and to be run by RunB without leaving procedure DOCMD in memory.
0	HDIR	BASIC09	Zimmerman, Doug	Executes a heirarchical directory listing for an entire directory.

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The OS-9 Solution menu gives you 25 commands at your fingertips, plus an additional command that lets you perform an identical action on more than one file. For example, it will let you copy a number of files, delete a number of files or examine a number of files with a minimum number of keystrokes.

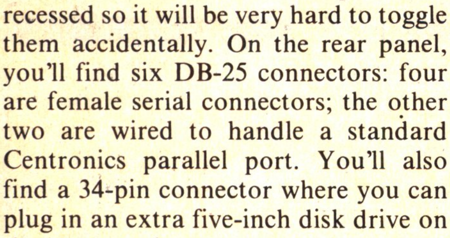
On the Hardware Front

After talking to Davis and Rosen, we ran into Joe Turner of Computer Systems Center in St. Louis. CSC has joined Great Plains Computer, Microware and Hazelwood Computer Systems in St. Louis to bring you high powered, OS-9-based computing on a shoestring.

For $995, you get a 68008-based computer running at an 8 MHz clock rate, 128K bytes of memory, 2K bytes of ROM, four serial ports, two parallel ports and jumper-selected Baud rates, plus a floppy disk controller and an SASI hard disk interface that can be connected directly to a Xebec S1410 controller. And, it all fits on the side of an 80-trg, the system with a Televideo 925 terminal. It makes that terminal look like a giant.

All switches on the front panel are recessed so it will be very hard to toggle them accidentally. On the rear panel, you'll find six DB-25 connectors: four are female serial connectors; the other two are wired to handle a standard Centronics parallel port. You'll also find a 34-pin connector where you can plug in an extra five-inch disk drive on the rear panel.

Inside this good looking cabinet, you'll find an 80-track, double-sided disk drive and a 10 megabyte hard disk. For the first 90 days, FHL will be selling this system with 512K bytes of memory — that's the same amount of memory you'll find in a fat Mac — for $2,695. Experienced hackers may buy only the Hazelwood board, power supply, cabinet and cable set if they wish. However, individual cables will not be sold.



The guys at FHL refer to the 'K' System as "QT" (Cutie).

```
      0    HELP           assembly         Seaton, W. G.       Prints user
information on the specified filename.

      0    INSTALL        assembly         Kreider, Carl R.    Makes bootable
disk by "Linking" a named file.

      0    LISTN          BASIC09          Bergvall, Bengt-Allan    Debugged and
modified LISTN from User Group Disk #0.  Exits correctly and allows standard
output path redirection by Shell.

      0    LLOAD          BASIC09          Snyder, Hal, M.D.   Uploads a text
file, one line at a time to a full-duplex bulletin board system.

      0    MODLIST        BASIC09          Snyder, Hal M.D.    Prompting IDENT
utility.

      0    QDIR           BASIC09          Waggoner, Roland T.      Original Carl
Kreider QdIR utility modified to send its output to standard output.

      0    REHOOK         BASIC09          Snyder, Hal M.D.    Moves a file from
one directory to another (on the0same device) without doing a COPY and DEL.
Workds like C GRAFT utility.

      0    REMOTE         assembly         Seaton, W. G.       Links user t a
specified remote terminal path for communication purposes.

      0    RMLOCATE       BASIC09          Kaleita, David L.   Calculates an RMS
record number for a given key field.

      0    RMNEW          BASIC09          Kaleita, David L.   BASIC09 callable
equivalent to Washington Computer Services' RMSnew utility.  Used to generate
a blank data file for RMS.


                                DISK NUMBER ONE

      1    DICT           Introl C         Williams, Eric      Dictionary look-up
program.  Finds words in dictionary or, if not found, offers what it thinks may
be the correct spell

      1    SPELL          Introl C         Williams, Eric      Lists words in
document not found in dictionary.

      1    UNWORDS        Introl C         Williams, Eric      Produces a
compressed dictionary as used by the program WORDS, SPELL and DICT.

      1    WORDS.C        Introl C         Williams, Eric      Prints un-coded
words from the file /D0/MISC/DICTIONARY as created by the UNWORDS utility.


                                DISK NUMBER TWO

      2    DICTIONARY     Compressed Data Williams, Eric       Dictionary file
for DICT program on disk number 1.  Requires double sided disk.


                               DISK NUMBER THREE

      3    PRINT.B        BASIC09          Bialon, Laura       file printing
utility adapted from K & P's Software Tools.

      3    SPLIT          Introl C         Williams, Eric      Lists two
specified text files, side-by-side on an 80 column screen.  Allows a visual
comparison of first 38 characters of each file.

      3    SQSH           assembly         Dibble, Peter       Squashes text
files by replacing every carriage return character with a "/" and every string
of more than one space with one space.

      3    TAB            Introl C         Williams, Eric      Converts spaces in
a text file into tabs (ASCII 9) and spaces;  TABs replace groups of eight
spaces.  Helps you reduce file size.

      3    TC             Microware C      Kreider, Carl R.    Does a line by
line compare of text files and prints lines that differ.

      3    TEXCOM         BASIC09          Kreider, Carl R.    Compares two text
files a one at a time.

      3    TRANSLIT       BASIC09          Bialon, Laura       Transliteration
program that works as described in Sections 2.7 through 2.9 of the book,
Software Tools by Kernighan and Plauger.
```

Why do more CoCo owners choose 'REAL TALKER'?

Sure it's priced right, but there's more...

Thousands of 'Real Talker' owners know 'Real Talker' beats ALL other Coco voice synthesizers in ease of use and flexibility. And, NO other Coco talker has a clearer, more intelligible voice. That's quite a lot of advantage when you consider Real Talker's unbeatable price. Yet, Real Talker has some important features that you simply will not find in other Coco talkers:

'Real Talker' is compatible with any 16K, 32K, 64K Extended or non-extended Color Computer. It works with any cassette or disk system and comes complete and ready to talk through your T.V. or monitor speaker. Price includes the 'Real Talker' electronic voice synthesizer in a ROM pack, software on cassette (may be transferred to disk), and user manual.

'SAY' command - You'll have your computer talking brilliantly in just minutes thanks to this powerful new command. Type SAY "ANYTHING YOU WANT" and your words are instantly spoken. It's that simple. Think how easy this makes creating speaking Basic programs. Adding speech to your existing programs is a snap too.

'CONVERT' - This is a truly powerful command for the basic programer. CONVERT automatically transforms a machine language dependent speaking program into a stand-alone Basic program. In other words, you can effortlessly write speaking Basic programs that do not require a machine language translator in memory. This is a unique feature of 'Real Talker'. No other voice synthesizer gives you anything even remotely approaching this type of capability - even synthesizers costing considerably more.

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TEXT TO SPEECH
INSTRUCTION
'REAL TALK
HARDWARE VOI
SYNTHESIZER
COLORWARE

'Real Talker' is a full-featured electronic voice synthesizer unit built into a compact cartridge case. You simply plug it into the side of your computer.

NOW INCLUDED WITH 'REAL TALKER'........

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2. ***'TALKING BATTLESHIP'***-It's you vs. the computer in this speaking version of the classic game.
3. ***'TALKING BLACKJACK'***- Play for big stakes against a rather talkative casino dealer.

ONLY

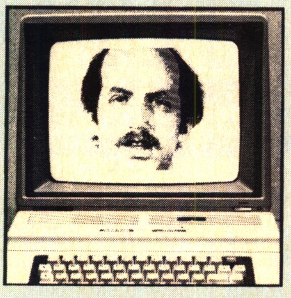
$59.95

Other features include software controlled pitch, unlimited vocabulary text-to-speech, and even a program that will recite any ASCII file (such as from Telewriter-64 & other word processors). You also get Colorware's unique full-screen phoneme editor program that let's you experiment with and modify speech at it's most fundimental level.

'REAL TALKER-1' (for the original Color Computer)...............	***$59.95***
'REAL TALKER-2' (for the Color Computer-2)..........................	***$64.95***
'Y - BRANCHING CABLE' For disk systems. If you have a disk system but do not have a Radio Shack Multi-Slot unit, this economical cable will allow to connect and use your Real Talker and Disk system together..................................	***27.95***

TALKHEAD

If you have a 'Real Talker', do not deprive yourself of this absolutely incredible machine-language Talking Head simulation program. While other talking head simulations use a minimal cartoon-like face, TALKHEAD uses high resolution, full-screen, digitized images of an actual person's face to create a life-like animated effect.



ACTUAL UNRETOUCHED PHOTO

SOFTWARE FOR THE 'REAL TALKER'

TALKHEAD can be easily commanded in Basic to appear on screen and say anything you want. Available on cassette or disk for only $19.95, TALKHEAD requires 64K and a Colorware 'Real Talker'.

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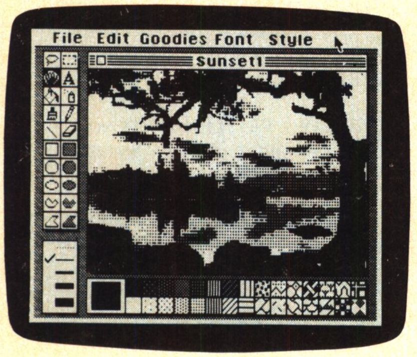
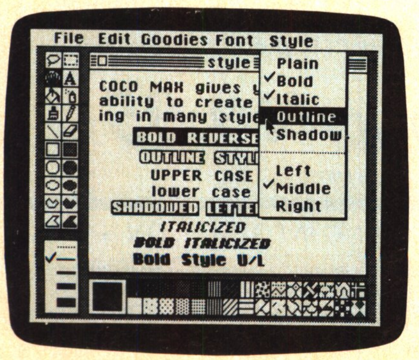
CoCo Max

This is one of those rare programs that will captivate everyone in your family.... No one can see CoCo Max and not want to try it!

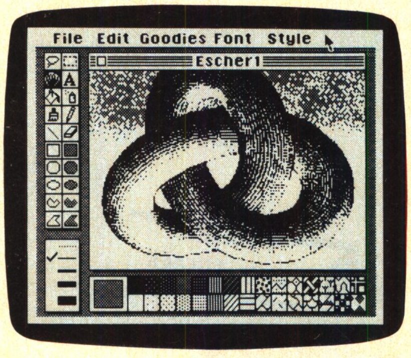

File Edit Goodies Font Style
Sunset1

We are all witnessing an exciting revolution in microcomputers: a radically new kind of computer and software that opens a whole new world of creative power to computer users.

It was inevitable that this exciting approach would be brought to the CoCo. With this in mind, Colorware chose to go all out and maximize this new concept for the color computer. That meant designing not just software but hardware too. It meant thousands of hours of pure machine language programming. Rarely has this much effort been applied to one product for the Color Computer.

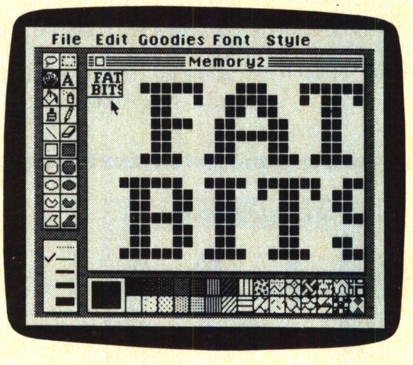

File Edit Goodies Font Style
style
Plain
✓Bold
✓Italic
Outline
Shadow
Left
✓Middle
Right

COCO MAX gives y
ability to create
ing in many style
BOLD REVERSE
OUTLINE STYL
UPPER CASE
lower case
SHADOWED LETTE
ITALICIZED
BOLD ITALICIZED
Bold Style U/L


File Edit Goodies Font Style
Escher1

UNMATCHED CAPABILITY...

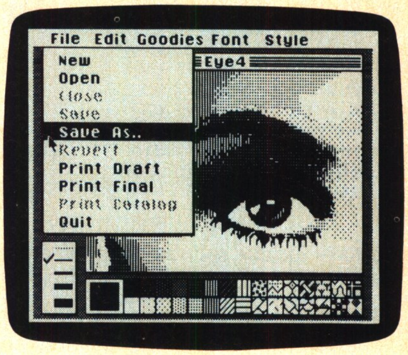
Because we took the maximum approach: highly optimized machine code combined with hardware, CoCo Max truly stands above the rest as the ultimate creative tool for the Color Computer. It's unrivaled performance lets you create with more brilliance and more speed than any similar system – much more than you ever imagined possible. And, you can do it in black & white or color.


File Edit Goodies Font Style
Memory2
FAT BITS
FAT
BITS

All the sophisticated power of the bigger systems is there: ***Icons, Pull-Down Menus,*** full ***Graphic Editing, Font Styles,*** and all kinds of handy tools and shortcuts.

Plug your joystick, mouse or touch pad into CoCo Max's Hi-Res Input Unit. Then use a delightfully simple ***Point-and-Click*** method to get any of CoCo Max's powerful graphic tools. It has them all:

You can ***Brush, Spray*** or ***Fill*** with any ***Color, Shading*** or ***Pattern.*** Use ***Rubber Band Lines*** and ***Shapes*** (square, rectangle, circle, elipse, etc.) to create perfect illustriations with speed and ease. There's a ***Pencil,*** an ***Eraser*** and even a selection of ***Caligraphy Brushes.*** And, as you can see, CoCo Max can do a lot with text.
All of the newest special effects are there: ***Trace Edges, Flip, Invert, Brush Mirrors,*** etc. And all of the very latest super-capabilities like: ***Undo,*** which automatically reverses your mistakes, and ***Fat Bits*** which zooms you way in on any part of your subject to allow dot-for-dot precision.


File Edit Goodies Font Style
Eye4
New
Open
Close
Save
Save As..
Revert
Print Draft
Print Final
Print Catalog
Quit

THE BIG PICTURE

The large image box in the middle of the CoCo Max screen is actually only a window on an even larger image. Use the Point-and Click "Hand" to effortlessly move your window over any portion of the larger image. You have a working area of up to 3-½ times the area of the window itself.

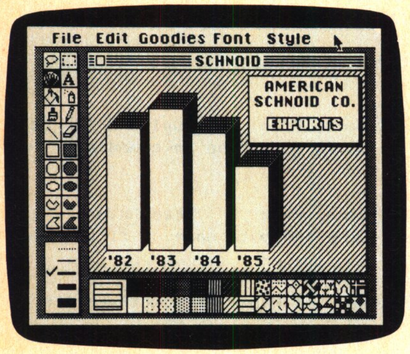
FLEXIBLE PRINTING...

CoCo Max gives you many ways to print. Fill a whole page with your image or condense two full CoCo screens to less than ¼ page for a finely detailed copy. "Dump" your CoCo Max screen full size or shrink it to ⅛ page size.

THE COCO MAX SYSTEM

FREEDOM TO CREATE...

Anyone who wants to create anything at all on their CoCo screen or printer will certainly be very glad to meet CoCo Max. CoCo Max's friendly yet sophisticated graphic and text capabilities let you almost instantly produce illustrations, diagrams, charts,



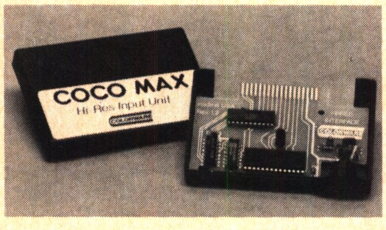
graphs, and computer art – for serious use or just for creative fun.

AN ABSOLUTE GUARANTEE

CoCo Max is a hardware/software system that no software-only system can match. Get CoCo Max and see your CoCo perform as it never could before. If you don't agree that CoCo Max is the ultimate creative tool for the Color Computer, simply return it within 20 days for a full, courteous refund from Colorware.

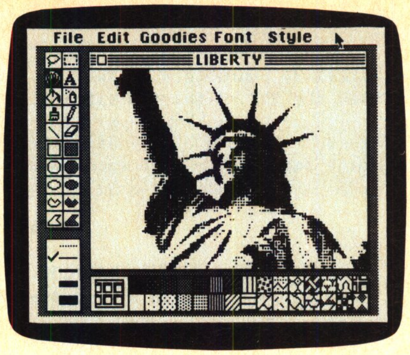
THE HARDWARE...

This is the key to CoCo Max's unmatched performance. Did you know the normal joystick input built into the Color Computer only allows access to 4,096 (64 x 64) points on the CoCo screen? Yet, the Color Computer's high resolution screen



has 49,152 (256 x 192) pixels. This means that a joystick, mouse or even a touch pad can, at best, only access about one tenth of the pixels on the CoCo screen.

Most graphic programs ignore this hardware limitation of the Color Computer and give you only low-res control. Others attempt to overcome the limita-



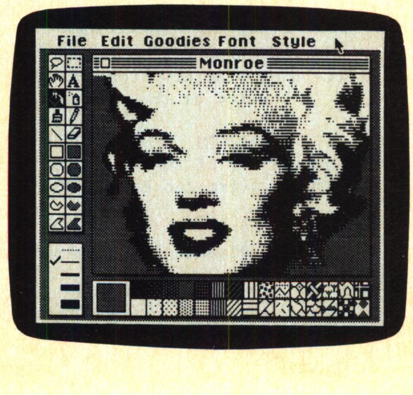
tion by using software schemes such as sliding windows. Although clever, these schemes yield sluggish and awkward results. Only CoCo Max does it the right way. The CoCo Max Hi-Res Input Unit plugs into your ROM slot and adds an entirely new joystick input to your computer – a precision one with a 49,152 point resolution to match the CoCo screen exactly.

Plug your same joystick, mouse or touch pad into this new input and you have a whole new kind of control. The difference is remarkable.

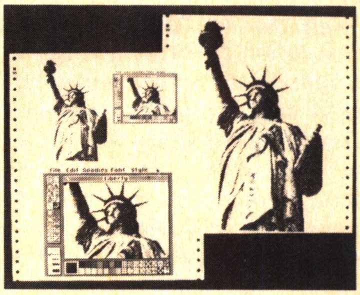
COCO MAX
CoCo Max

A DIGITIZER OPTION...

We studied all the video digitizers available and picked the best of them to link with CoCo Max. The DS-69 from Micro Works was our choice. This optional device lets you capture the image from any video source (video recorder, camera, etc.) on your Color Computer.



You may then use CoCo Max's graphic magic on it. The DS-69 is available as an option from Colorware from $149.95 complete with its own software on disk or tape. Using the DS-69 with a disk requires an RS multi-pak adaptor.



COCO MAX REQUIREMENTS

The CoCo Max System includes the Hi-Res Input Unit, software on disk or cassette (please specify) and user manual. It will work on any 64K Extended or non-extended Color Computer. You'll need a Radio Shack or equivalent joystick, mouse or touch pad. Disk systems require a Multi-Slot Interface or Y-Branching Cable.

THE COMPLETE COCO MAX SYSTEM,
with software on *DISK*........... ***$69.95***

with software on *CASSETTE* (Available Mar '85)......................... ***$69.95***

Y-BRANCHING CABLE-If you have a disk system but do not have a Multi-Slot Interface, use this economical 40-pin, 1 male, 2 female cable to connect the CoCo Max Hi-Res input unit and your disk controller to your CoCo..... ***$27.95***

Sorry, COCO MAX is not compatible with JDOS

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Free *DynaForm* Upgrade

Al Jost has completely rewritten *DynaForm* in C. It will run on the Color Computer with *O-Pak* and will take up to 800 index entries. Because it was not written in PASCAL, this version of *DynaForm* does not require the separate file, *pinterp*, to be in memory. You need only copy the new "df" command into your execution directory and run it.

An initialization file named *df.init* makes it easy for you to set up *DynaForm* to work with your printer or define your own standard formats, headers, footers or macros. As a minimum, you will need to include a command to specify your printer path; commands that tell *DynaForm* how your printer boldfaces and underlines; a flag that tells *DynaForm* if your printer generates an automatic linefeed character with each carriage return; and any optional command you would like to boilerplate in order to print italic, emphasized, compressed or expanded characters.

From the new *DynaForm* command line, you can now choose an alternate printer, "df MyFile my_printers_name," or tell *DynaForm* to get its input from the standard input path. Ah, another filter! To do this you would type a command line like this:

```
Direx!df -
```

The minus sign or hyphen causes *DynaForm* to read its input from the standard input path instead of a file.

The best news of all is the price. To get the new *DynaForm*, send your original FHL *DynaForm* disk and $2 for postage to FHL. You'll receive your new disk by return mail.

L.A. OS-9 Users Group

After one of the OS-9 seminars, we had the chance to talk at length with Milton Wolfe. His brother, Norm Wolfe, has formed a local OS-9 Users Group that meets the second Saturday of every month at the Los Angeles Library, 2820 West 6th Street. If you're in Southern California and need information, drop him a line or call him at (213) 255-1396.

Software Exchange Library

I spent a weekend preparing a valuable addition to this month's column — an organized listing of each program in the OS-9 Users Group Software Exchange Library. Since

```
     3     UNTAB          Introl C         Williams, Eric      Replaces TAB
(ASCII 9) characters in the specified input file with eight spaces.  Used to
UNDO the TAB filter described earlier.

     3     WORDS.A        assembly         Dibble, Peter       Parses input into
words and outputs each word on a separate line.


                              DISK NUMBER FOUR

     4     BINCOM         BASIC09          Kreider, Carl R.    Performs a
byte-for-byte compare of two specified files

     4     DCOPY          BASIC09          Capouch, Brian      Full directory
copy utility.

     4     GRAFT          Introl C         Williams, Eric      Copies a sub-tree
of a directory structure.  Works similar to DSAVE except an intermediate
procedure file is not created.

     4     LATEST         Introl C         Williams, Eric      Scans named
directory and all directories below it, printing the path name of files whose
last modified date is later than (DATE).

     4     MODBUILD       BASIC09          Snyder, Hal M.D.    Prompting file
MERGE utility.

     4     MODULE         Introl C         Williams, Eric      Removes the named
modules from the specified file and sends result to standard output.  Works
like IDENT if no names are given.

     4     MV             Introl C         Williams, Eric      Moves files from
one sub-directory to another by manipulating directory references (no data is
actually moved) ... very fast!

     4     PWD            assembly         Dibble, Peter       More powerful
version of Microware's PWD command.


                              DISK NUMBER FIVE

     5     EQUFIX         BASIC09          Kreider, Carl R.    Strips comments,
blqnk lines, and pseudo opts from equate files.

     5     EXTRACT        Introl C         Williams, Eric      Filters a single C
function definition from a C source text file.  The specified function appears
on standard output path.

     5     FLEXBIN        BASIC09          Kaleita, David L.   Converts "FLEX
format" (compressed) binary files into full image (full size, position
dependent) binary files, ready to "ROM."

     5     HX             assembly         Dibble, Peter       Converts standard
input data to readable hex dump format output

     5     INTRUDER       Introl C         Williams, Eric      Prints a formatted
hex and ASCII dump of the specified sector of the named input file (including
directory files).

     5     NEWSTRIP       BASIC09          Puckett, Dale L.    Filter that strips
all control characters except CRs out of standard input path.

     5     PAD            BASIC09          Kreider, Carl R.    Improves
readability of disassemblies by inserting blank lines after control transfer
statements, etc.

     5     PATCH          Introl C         Williams, Eric      Changes selected
bytes of any file.

     5     SORT           Introl C         Williams, Eric      Sorts lines of
text appearing at standard input and sents sorted version to standard output.

     5     STRIPNUM       BASIC09          Kaleita, David L.   Strips a specified
number of characters from the beginning of each line in a text file.  A new
file is created as the output.

     5     STRIPREM       BASIC09          Kaleita, David L.   Strips all REM
statements out of the specified input file (which is not modified).  A new
PROCEDURE is created as output.

     5     STRIPZ         BASIC09          Kreider, Carl R.    Copies zxxxx
labels from disassembly to separate file or creation of substitution file with
editor.
```

commercial software costs so much, this information should be a real blessing to hackers on a tight budget.

Most of the program disks produced by Dave Kaleita and his software exchange committee contain eight to 10 programs. Some of them are roughly equivalent to commercial utility packages selling for $50 to $85. OS-9 User Group members can order them for only $3 — the cost of the disk, duplication and mailing at P.O. Box 7586, Des Moines, IA 50322. Unfortunately, IRS regulations governing nonprofit educational organizations will not allow us to sell the disks to nonmembers.

Kaleita has worked hard during the past year to organize the group's holdings and has completed program assignments to disk numbers zero through 25.

Kaleita keeps his records in a large RMS database and, unfortunately, we do not have enough space for everything in "KISSable OS-9." Since we wanted to get the pertinent information to you, I reduced it to the key data.

Each record in the listing tells you the number of the disk that contains the program, the language it is written in, the name of the author and the purpose of the program. I sorted each disk alphabetically, then placed the listing for each disk in numerical order. Now if you see a program you need, you'll know which disk to buy.

While we're on the subject of the Users Group Library, check out this extraordinary offer from Kaleita. If you are fortunate enough to own 80-track (96 tpi) double-sided, double-density drives, Dave will send you the complete software library if you send him six preformatted disks in a reusable, self-addressed package (include full return postage). His offer only holds for a month or two, but the temporary address is P.O. Box 666, Sterling Heights, MI 48311-0666.

Two Dots, A Typesetter and Printer Baud Rates

We've received several calls and a letter or two about the " . +memory offset" we have printed in several procedures here in the column. The typesetter justifies the extra space and makes it look like we are typing two periods next to each other.

In action, the first dot means do this at the current counter location. The space that never seems to be printed means I am going to give you another command. And, the ".+offset" means,

```
                              DISK NUMBER SIX

    6    ADVENT          Microware C     Sieffer, Michael J. Source code for
Adventure game.

                              DISK NUMBER SEVEN

    7    ADVENT          Microware C     Sieffer, Michael J. Object code for
Adventure game

                              DISK NUMBER EIGHT

    8    CHECKBOOK       BASIC09         Puckett, Dale L.    Simple program to
help user balance a checkbook.

    8    FINANCE         BASIC09         Puckett, Dale L.    Menu driven
program that makes a number of financial calculations.

    8    JERRYBENCH      BASIC09         Poumelle, Jerry     10 X 10 matrix
multiply benchmark.

    8    SIEVE           BASIC09         Morse, Greg         Self-timing
benchmark

                              DISK NUMBER NINE

    9    CB              Microware C     Kreider, Carl R.    Converts poorly
structured C programs to K & R style.

    9    FINDFUNC        Microware C     Kreider, Carl R.    Generates a list
of funtions from C source, including the file and line.

    9    LIB             Microware C     Kreider, Carl R.    Splits the
Mircroware C library back into modules for modification or addition.
Generates a file of the module names.

    9    MAKDIR.A09      Introl C        Williams, Eric      An Introl C
subroutine that performs MAKDIR function without calling the Shell.

    9    PPC             Microware C     Kreider, Carl R.    Titles, dates
and paginates C listings.

    9    XC              Microware C     Kreider, Carl R.    Cross reference
generator for C programs.

                              DISK NUMBER TEN

   10    AVERAGE_STDEV   BASIC09         Morse, Greg         Calculates means,
standard deviations, cross products and sums of squares for two arrays of
numbers.

   10    FAST_FOURIER    BASIC09         Morse, Greg         Performs the
complex fast fourier transform of arrays up to 2048 entries.

   10    LINEFIT         BASIC09         Morse, Greg         Finds least square
fit lines through a set of data points (x y) as well as their means, standard
deviation and correlation coefficient.

   10    NETWORK         BASIC09         Kreider, Carl R.    Electronic Circuit
network design and analysis.

   10    RESRAT1HC       BASIC09         Kreider, Carl R.    Prints all 1%
resistor combinations that fit the specified resistor ration and error
(tolerance) limits.

                              DISK NUMBER ELEVEN

   11    COL             Pascal          Tyler, William R.   Columnates
standard input to standard output.

   11    FINDS           Microware C     Kreider, Carl R.    Finds specified
strings in a file.

   11    PF              Microware C     Waggoner, Roland T. Formatted print
program.  It accounts for line feed in long lines of BASIC09 list files.  Also
allows arbitrary header.

   11    PRINT.C         Microware C     Jones, James E.     Yet another file
printing program.
```

I want you to add "offset" to the present value of the counter. Remember, when you see two "dots" followed by an offset value, you need to type a space between the two dots.

Courtesy of Christopher Blum in Nova, Ohio, here's a procedure that will let you set up the PRINTER and RS232 modules in OS-9 version number 1.01.0.

```
DEBUG
L PRINTER
. .+65
=04
=82
=01
=A2
=00
=CD
=00
=63
=00
=2D
=00
=13
=00
=05
L PRINTER
. .+9C
=12
=C6
=00
=59
=58
L PRINTER
. .+AA
=F2
L PRINTER
. .+11F
=99
=C0
=94
L RS232
. .+B2
=04
=82
=01
=A2
=00
=CD
=00
=63
=00
=2D
=00
=13
=00
=05
L RS232
. .+E1
=12
=C6
=00
=59
```

11	UPLOW	Microware C	Harris, Timothy A.	Converts text to all upper or all lower case.
11	WC	Microare C	Harris, Timothy A.	Counts words, characters and lines in a text file.
11	COL	Pascal	Tyler, William R.	Columnates standard input to standard output.
11	FINDS	Microware C	Kreider, Carl R.	Finds specified strings in a file.
11	PF	Microware C	Waggoner, Roland T.	Formatted print program. It accounts for line feed in long lines of BASIC09 list files. Also allows arbitrary header.
11	PRINT.C	Microware C	Jones, James E.	Yet another file printing program.
11	UPLOW	Microware C	Harris, Timothy A.	Converts text to all upper or all lower case.
11	WC	Microare C	Harris, Timothy A.	Counts words, characters and lines in a text file.

DISK NUMBER TWELVE

12	ASCIIFY	Pascal	Tyler, William R.	Converts file into hex/ascii form.
12	DEASCII	Pascal	Tyler, William R.	Opposite function of ASCIIFY. Converts files from HEX/ASCII form to original.
12	LISA	assembly	Lyall, Peter W. Jr.	Lists bunched up assembly language source code in a tabbed assembler format to standard output.
12	SHOREGS	assembly	Morse, Greg	Shows the 6809 registers on the standard error path. Useful when debugging assembly language programs.
12	SHOWC	Microware C	Kreider, Carl R.	Lists a file showing non-printable characters.
12	SYSTEST	BASIC09	Lyall, Peter W. Jr.	Lets you test the effects of OS-9 system calls from a "stable" environment.
12	TCMP	Microware C	Kreider, Carl R.	Text file compare with re-synchronization. It also shows differences between files.

DISK NUMBER THIRTEEN

13	GREP	Microware C	Kreider, Carl R.	The UNIX pattern finding utility.
13	SPINT	Microware C	Harris, Timothy A.	GREP-like utility to match text patterns and print lines with (or without) the pattern.
13	TR	Microware C		The translit utilitv from the K & P Software Tools book.
13	UNIQ	Microware C	Kreider, Carl R.	The UNIX UNIQ utility.

DISK NUMBER FOURTEEN

14	ARC	Microware C	Kreider, Carl R.	Archives file structures by date
14	DELW	Microware C	Kreider, Carl	Wild card delete.
14	DIRW	Microware C	Kreider, Carl R.	Wild card Dir program.
14	TREE	Microware C	Kreider, Carl R.	Prints tree structure of a disk. Optionally reports space used.

DISK NUMBER FIFTEEN

15	ACIA.MAPIN	assembly	Dibble, Peter	Filter to change control strings from a terminal into corresponding ANSI strings.

THE X-TEAM FOR OS-9

XTERM

XTERM is a full featured OS-9 communications program that takes full advantage of the power of OS-9. It works with the normal text screen, XSCREEN, or the Wordpak 80 column board.

XTERM is menu oriented for ease of use, it is simple to use even for the novice OS-9 user. And yet, XTERM is powerful enough for the expert OS-9 user.

Some of the features of XTERM include: full upload and download support with remote buffer operation; supports XON/XOFF protocol; 110/300/600/1200 baud, 5/6/7/8 bits, even/odd/no parity, full or half duplex; able to execute an OS-9 shell command from within XTERM.

XTERM works with a Color Computer using the standard serial interface, but also will work with a hardware serial port. Also, if you are using a hardware parallel printer port, you can print data to the printer as it is received.

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XMENU is a system that creates a menu-driven environment for the Color Computer using OS-9. OS-9 now becomes easy-to-use with command selections made from menus. Menus are included to access OS-9 commands. An easy-to-use utility is provided that allows for the creation and maintenance of menus.

XMENU works with XSCREEN, the normal text screen, O-PAK, and the WORDPAK 80-column board.

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XSCREEN creates a high resolution screen for the Color Computer using OS-9. This high resolution screen gives you 24 lines of text with 51, 64, or 85 characters per line. Characters can be either white on a black background or vice versa. Easy menu operation.

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Some of the formatting features of XWORD include: proportional spacing supported; perfectly aligned hanging indents and columns, even when using proportional characters; full printer control with control of character size, emphasized, italics, overstrike, underlining (with or without spaces), super and sub-scripts; up to 10 header/footers; page numbering in decimal or Roman numerals; margins and headers can be set differently for even and odd pages; automatically reads printer initialization file to define XWORD for your printer (many included, and easy to write or modify your own). Many more features.

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XMERGE gives XWORD powerful mail merge capabilities. With it you are able to merge in data from a data file or from the keyboard to get professional looking results.

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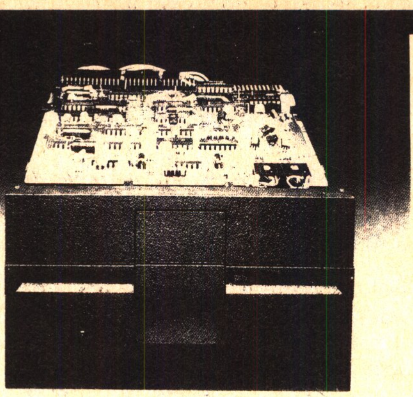

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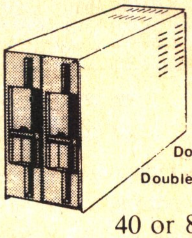

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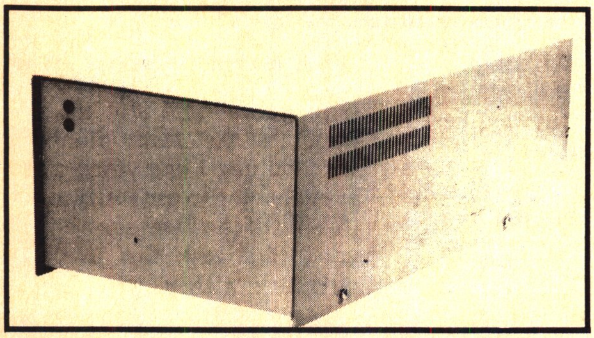

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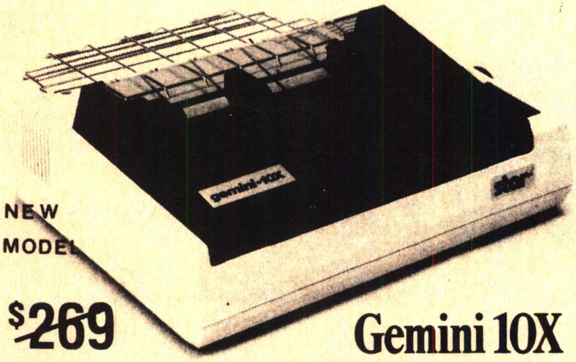

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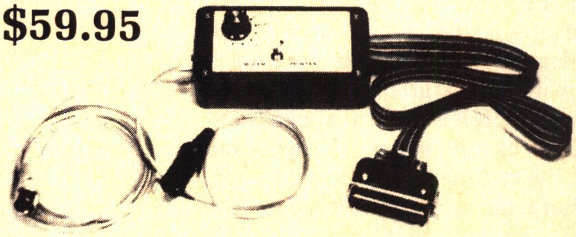

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```
=58
L RS232
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=F2
L RS232
. .+11B
=AC
=FC
=FA
Q
COBBLER /D0
```

When you use the procedure you must make sure you run the procedure on your copy of the OS-9 system disk, not the original. Then, after you boot from the corrected disk, you must use XMODE to set /P1 and /T1 to the proper Baud rate.

> ***"When working with string variables under BASIC09, remember this language uses an $FF Hex or 255 decimal to mark the end of a string."***

Also, you must make sure that any software that modifies itself or any OS-9 module in the boot file hasn't been run before you run the COBBLER command. If you run COBBLER with modified modules in memory, it will create an "unbootable" disk!

BASIC09 Tip

Here's a tip from David Curtis, KC8TK in Heath, Ohio. When you are working with string variables under BASIC09, remember that this language uses an $FF Hex or 255 decimal to mark the end of a string. This is usually not a problem, but David was creating a string with the statement "mystring:=mystring+CHR$(x). This appeared to be OK — except when 'x' was equal to 255. Every time 'x' was equal to 255, that character wasn't included in the string. He got around it by sending 254s to his printer instead of 255s.

More UNIQ

Last month we showed you a quick and dirty way to use BASIC09 to find out if you had any doubles in a list of words — a sorted dictionary, for example. That program was born of necessity and got the job done — one file at a time. This time, we'll show you several additional ways to write the same program.

First, we'll show you how to add a prompt line so you can tell BASIC09

```
    15    ACIA.MAPOUT     assembly        Dibble, Peter       Appendage for ACIA
driver that gets control of INIT, READ and WRITE and passes them thru ACIA to
physical device.

    15    DNLOAD          assembly        Degler, Roger L.    Copies input from
specified device to StdOut.  Echoes received characters back to host as signal
to send more.

    15    FM              BASIC09         Kreider, Carl R.    Creates a file of
message originators when fed downloaded CIS messages -- see insert & ninsert.

    15    INSERT          BASIC09         Kreider, Carl R.    Reads the file
created by "fm" and inserts new users into the "users" file.

    15    KILL13          BASIC09         Snyder, Hal M.D.    Strips all hex 13
(X-OFF) characters from a file.

    15    MODEM           assembly        MacLean, D.         Copies characters
to/from a specified device.

    15    NINSERT         BASIC09   0     Kreider, Carl R.    Generates a file
(nusers) sorted by CIS number from the file "users."

    15    TUBE            Introl C        Williams, Eric      Copies characters
to/from device.  Has 1200/300 baud speed change capability.

    15    UPLOAD          assembler       Degler, Roger L.    Copies standard
input path to specified device.  Waits for characters to be echoed back.

                            DISK NUMBER SIXTEEN

    16    ANSI.GOTOXY     assembly        Dibble, Peter       Video terminal
data module for ANSI standard terminal used with DynaStar screen editor.

    16    CCGOTOXY        assembly        Lyall, Peter W. Jr. GOTOXY module for
normal DynaStar and either O-Pak or Word-Pak.  Completely remapped Color
Computer keyboard.

    16    CLOCK           assembly        Williams, Eric      Clock driver
module for Computerware 6800 CL4 CalClock/Timer board.

    16    CoCo_Configurations             Tyler, William R.   Configuration
information needed to run RMS, DynaCalc and DynaStar (standard versions) on
Color Computer equipped with PBJ Word-Pak or FHL O-Pak.

    16    KIMTRON         assembly        Kaleita, David L.   Set of files to
help you use the Kimtron ABM-85 terminal with OS-9.  Includes startup file
that auto-programs function keys and a DynaStar GOTOXY module.

    16    P1              assembly        Fischer, Stephen    Parallel printer
driver for TRS-80 Color Computer.

    16    PRSET           Pascal          Tyler, William R.   Sets the
programmable parameters of the GE (Genicom) 3404 line printer.

    16    PRSET_10X       Pascal          Tyler, William R.   Sets some of the
programmable parameters of the Gemini 10X line printer.

    16    SERIAL          assembly        Puckett, Dale L.    Interrupt driven
device driver that replaces Color Computer RS-232 driver.  Allows operaton up
to 19.2 Kbaud.

    16    SETERM          BASIC09         Crawshaw, Mike      Configures
terminal from configuration files.

    16    SETPARAM        BASIC09         Crawshaw, Mike      Modifies terminal
configuration files.

    16    TERM_UTILS      BASIC09         Crawshaw, Mike      Utlities for
screen formatting and data entry.

    16    TVI970_CONFIG   assembly        Tyler, William R.   Configuration and
other programs for a Televideo 970.  Helps you run DynaStar and DynaCalc.

                           DISK NUMBER SEVENTEEN

    17    BLANKO          BASIC09         Capouch, Brian      Blanks a complex
data structure to nulls.

    17    CHAR_TO_INT     BASIC09         Capouch, Brian      Two procedures to
convert BASIC09 strings to INTEGERS and back.
```

which list of words you want to check. Then, we'll show you how to write the program as a filter so you can have it read your list of words from the standard input path. And finally, we'll show you how you can write the same program so it passes all words through from standard input to standard output, except additional copies of duplicate words.

As a bonus, you'll also find a listing of a procedure called *WordOrder* that will check a list of words and report any that are out of alphabetical order. Here are the command lines for the two filters.

```
OS9:list uniqtest ! uniq_filter
OS0:list uniqtest ! uniq_remove
```

The two command lines above assume you have saved the BASIC09 source code of the procedure and then packed it into your current execution directory, usually /d0/CMDS.

That's all for this month. If you live in the Chicago area, look for us at the RAINBOWfest there. We'll be signing copies of *The Complete Rainbow Guide to OS-9*.

17	CHECK_FILE	BASIC09	Capouch, Brian	Determines the file status of a specified input file.
17	DATE_CVT	BASIC09	Capouch, Brian	Converts date between two formats: MM/DD/YY to/from YYDDD (where "DDD" is the Julian Day of the year form 1-365).
17	DOLLAR_PRINT	BASIC09	Capouch, Brian	Converts "REAL" amount (<=999.99) to "STRING" "DOLLAR" format.
17	ERREPORT	BASIC09	Capouch, Brian	Prints message on line two of terminal, waits for Control-F acknowledgement.
17	INKEY	assembly	Doggett, R.	Determines if a key has been typed on the given path qnd if so returns the next input character as the string variable.
17	INKEY_HAL	assembly	Snyder, Hal M.D.	Reads individual key depressions from Basic09.
17	ISAM	BASIC09	Jones, James E.	Primitive ISAM package.
17	GETNUMB	BASIC09	Morse, Greg	More powerful version of the BASIC09 VAL function.
17	LOWUP	assembly	Kaleita, David L.	A BASIC09 subroutine that converts up to 252 string variables to all uppercase ASCII characters.
17	MODLINKB	assembly	Microware	Links to a data module so that data may be passed through the data module to/from all other processes that have0linked to it.
17	POPEN	BASIC09	Doggett, R.	Creates a pipe by DIPEing one of the standard paths and using the path as the pipe that will go to or from the FORKed pipeline process.

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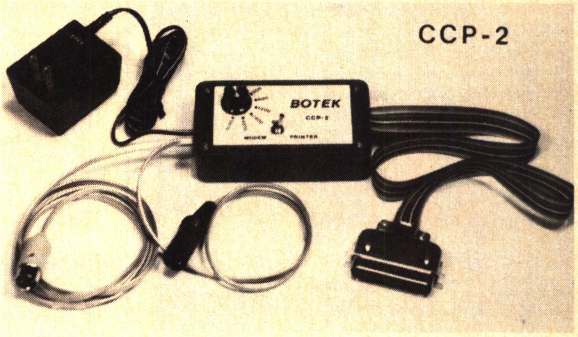

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17	PWD_NAME	BASIC09	Capouch, Brian	Performs a PWD and returns the result in a BASIC09 string variable.
17	SYSCALL	assembly	Doggett, R.	Universal system call subroutine -- Microware version.
17	SYSCALL_HAL	assembly	Snyder, Hal M.D.	Executes an OS-9 system call from BASIC09.
17	TERM_CTL	BASIC09	Capouch, Brian	Performs special terminal control sequences.

DISK NUMBER EIGHTEEN

18	BASUTIL	assembly	Kreider, Carl R.	Used from BASIC to set a user ID or return a terminal name.
18	CHANGEPASSWORD	BASIC09	Crawshaw, Mike	Allows users to change their password.
18	CHANGETERM	BASIC09	Crawshaw, Mike	Dynamically modify your termnal configuration.
18	CHVOLNAM	BASIC09	Millenaar, Rob P.	Changes the name of a volume (disk).
18	DDISPLAY	assembly	Mason-Sherwood, Tony	Same as Display utility, except characters to be displayed are specified in decimal rather than hex.
18	DISKID	BASIC09	Lyall, Peter W. Jr.	Allows you to rewrite the disk name and date on logical sector number 0 after the BACKUP command has overwritten it.
18	DISKLOCK	BASIC09	Schira, John C.	Makes an OS-9 disk inaccessable to normal system commands.
18	ILEAV	BASIC09	Kreider, Carl R.	Prints disk interleave tables.
18	LISTPASSWORDS	BASIC09	Crawshaw, Mike	Gives the superuser a list of users and their passwords.
18	LISTUSERS	BASIC09	Crawshaw, Mike	Gives the

DISK NUMBER NINETEEN

19	DISASM	assembly	Meijndert, Joe	OS-9/6809 disassembler adapted from program in Byte magazine, February 1982. Includes OS-9 system calls.
19	GO	assembly	Tyler, William R.	Job Control Language which uses either current working directory or a macro library for macro input. Uses 1K.
19	XLISP	Microware C	Jones, James E.	Lisp-like language with object-oriented functions.

DISK NUMBER TWENTY

20	GRAPH1	BASIC09	Lyall, Peter W. Jr.	Displays graphics available using Color Computer with PBJ 80 column Word-Pak.

DISK NUMBER TWENTY-ONE

21	APPEND	assembly	Morse, Greg	Appends one or more in files (which may include stdin) to an output file (which may be stdout).
21	D	Microware C	Harris, Timothy A.	Lists current directory, one entry per line with wild card matching.
21	DEL	Pascal	Tyler, William R.	Identical to standard DEL except it returns its own error messages (ideal for level II) and does not stop deleting files on errors.
21	DIR	assembly	Mason-Sherwood, Tony	DIR command for 64 column format screens.

21	DIRLISTER	BASIC09	Kapaldo, Paul J.	Prints out a hierarchical directory listing of a disk.
21	DL	assembly	Harris, Timothy A.	Delete utility with option read list of file names from stdin instead of as parameters.
21	FCOPY	BASIC09	Crawshaw, Mike	Reads a file of files and generates a Shell script to copy those files.
21	OWNER	Microware C	Kreider, Carl	Changes owners of files and directories.
21	POST	BASIC09	Hock, Darryl A.	Merges RMS data files. Helps post smaller files into a master data base.

DISK NUMBER TWENTY-TWO

22	EMD	Microware C	Kreider, Carl R.	Extended memory dump for Level II systems.
22	NEW_HEX_DUMP	BASIC09	Puckett, Dale L.	Filter that outputs a hex dump of standard input path. Works well in a pipeline.

DISK NUMBER TWENTY-THREE

23	COMPRESS	Microware C	Jones, James E.	Data compression filter.
23	CRYPT.A	assembly	Harris, Timothy A.	Encodes and decodes files using a personal keyword.
23	CRYPT.C	Microware C	Jones, James E.	Four-rotor enigma machine encryption/decryption filter.
23	FIELD	Microware C	Millenaar, Rob P.	Select fields or columns from standard input and send to standard output.
23	STRIP	Microware C	McCoppin, Ray	Optionally strips any combination of control characters,0carriage returns and/or line feeds from a text file.

DISK NUMBER TWENTY-FOUR

24	CHKNG	Introl C	Williams, Eric	Electronic Checkbook that allows you to enter and edit check information, mark cleared transactions and obtain cleared and actual balances.
24	DATES	Microware C	Millenaar, Rob P.	Keeps track of dates, appointments, birthdays, etc. and warns if they are coming up soon.
24	MORTGAGE	BASIC09	Morse, Greg	The best mortgage program ever!
24	MUSIC	BASIC09	Kaleita, David L.	An audio recording cataloging system.

DISK NUMBER TWENTY-FIVE

25	BUILD	assembly	Covici, John	Buffered version of BUILD which writes to the disk less often and terminates with EOF.
25	CAT	Microware C	Harris, Timothy A.	Concatenates files to standard output.

OTHER PROGRAMS

UKN	ANTENNA	Basic09	Johnson, Robert E.	Designs amateur radio VHF long yagi antennas.
UKN	FORMS2.GNX	Microware COBOL	Morse, greg	Structured and maintainable 100 percent replacement for Micro Focus Forms2 package. Includes files Forms2.GN1 and Forms2.GN2.
UKN	LIST	assembly	Microware	Lists a text file and prints title, page number, and date (works like the new "PR" utility by Microware).
UKN	PRINT.A	assembly	Microware	Tabs an assembler listing with page number, title and date.

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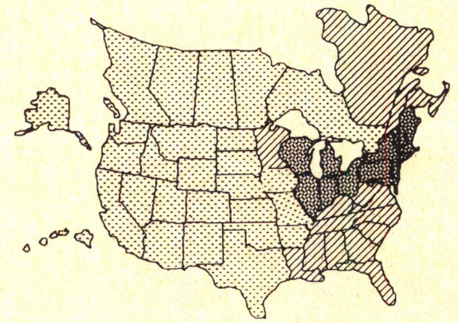

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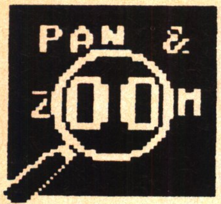

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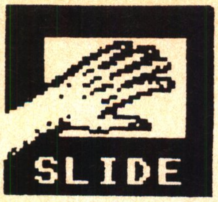

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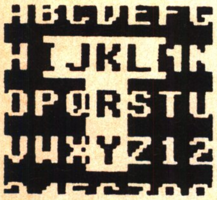

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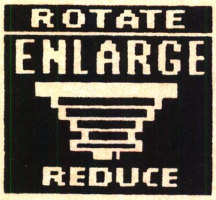

Enlarge or reduce any part of a screen by any amount, proportional or nonproportional. Rotation can be anything from 0 to 359 deg.

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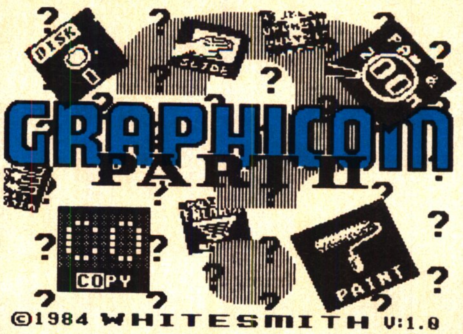
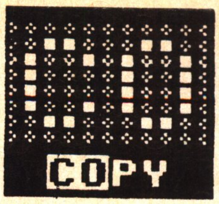


GRAPHICOM PART][is a menu-driven graphics utility that does not require the original GRAPHICOM to run. It includes many of the functions that are missing in GRAPHICOM and will load and save both STANDARD (binary) and GRAPHICOM format screens. GRAPHICOM PART][requires a 64K Color Computer or Color Computer II, and at least one disk drive, It supports 1 to 4 disk drives, keyboard or joystick input, COLOR or B/W (hi-res) operation, and 4 screen display modes. "OOPS" command provides recovery after mistakes, and allows experimenting. Supplied on disk with a 34 page manual.



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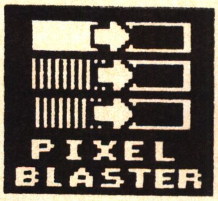
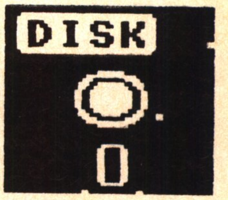


Substitute colors, swap BLUE and RED, remove WHITE (removing all color widens lines for painting!), create color separations.



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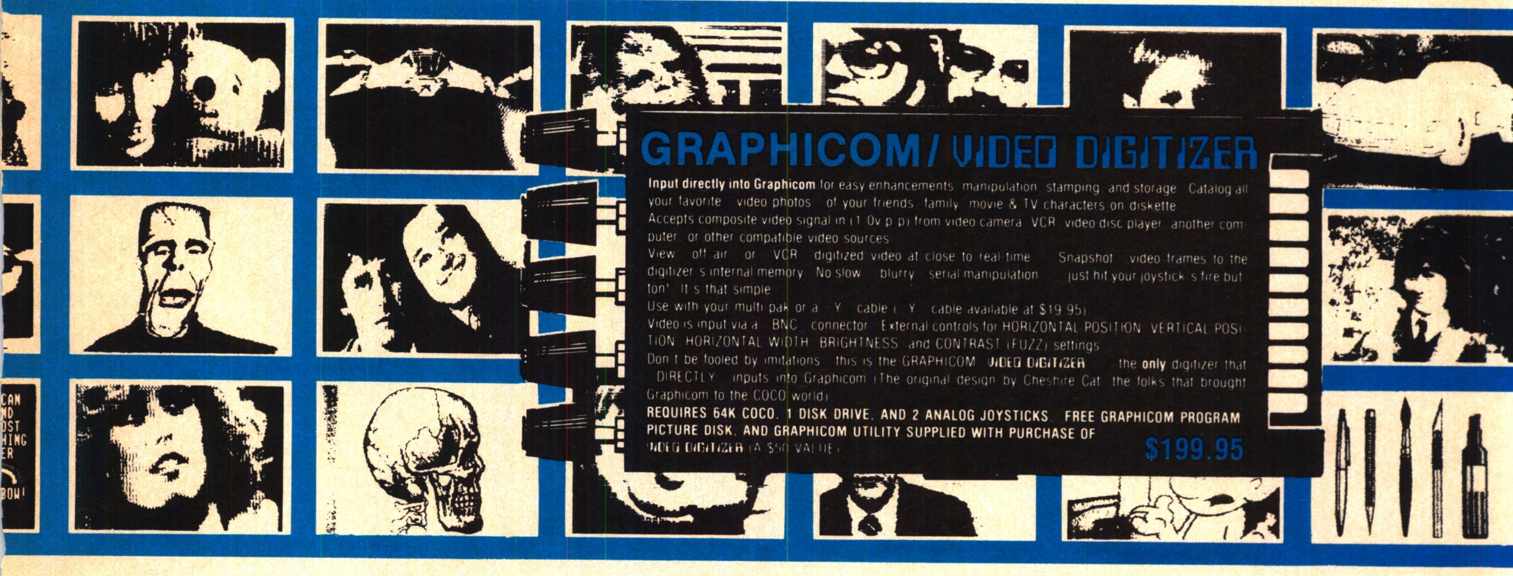

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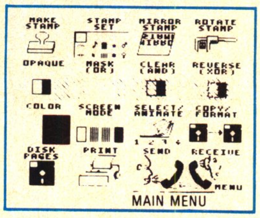
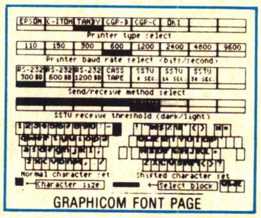


MAIN MENU



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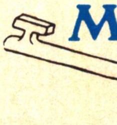

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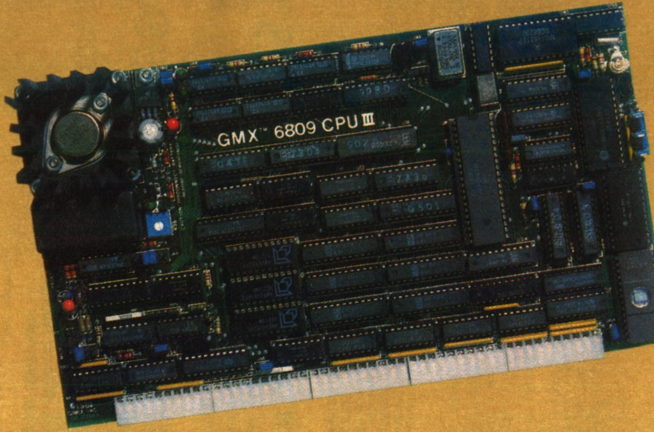

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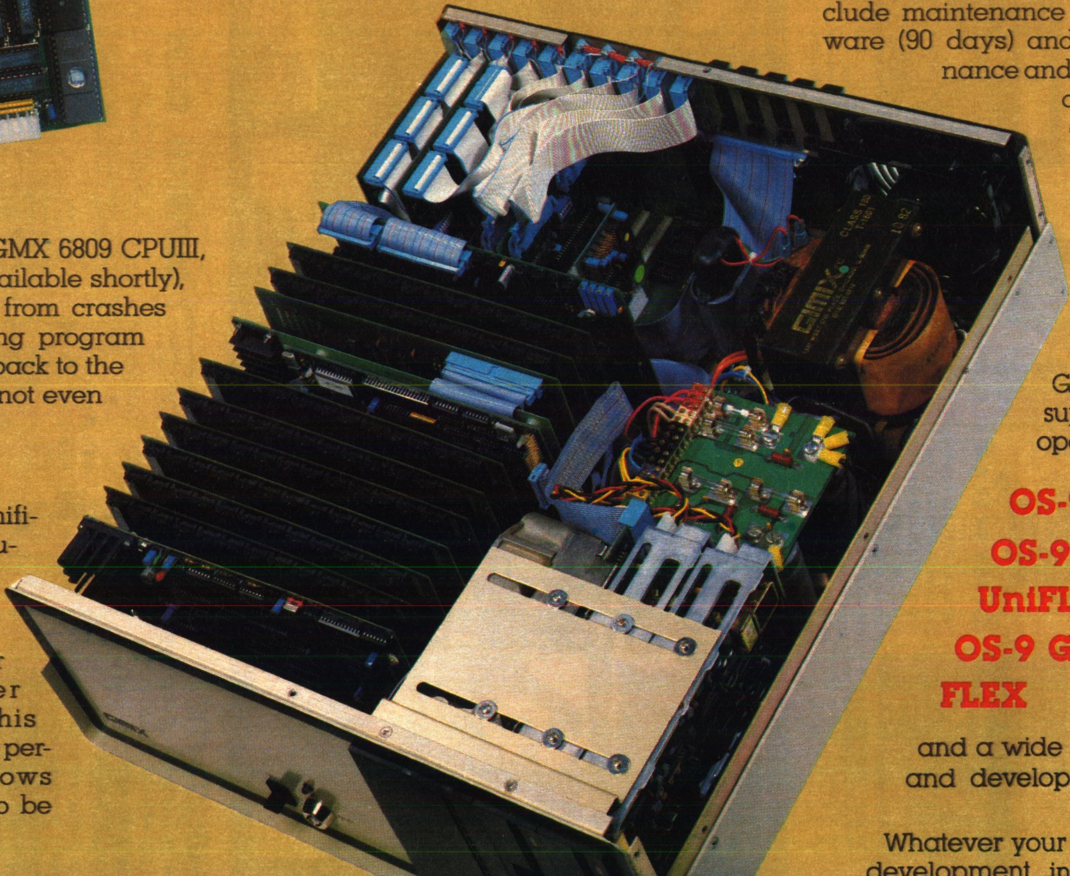

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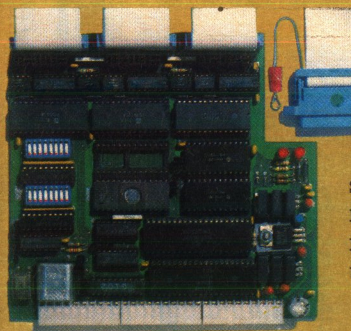

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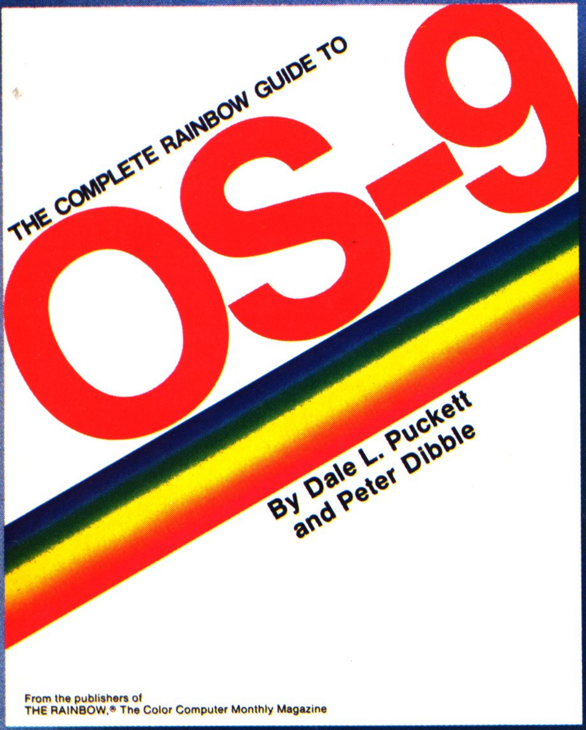
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